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Table of Contents

NEWS DEVELOPMENTS

Principals in Foreign Oil Policy Dispute Preparing Cases 48
Soviet Advances Pointed at Nazi Oil Supply in Rumania 49
Refiners Warned of Trend to Socialization 50
Technical Papers Draw Crowds to A.P.I. Meeting 52
Industry Urged to Take Steps for Deferment of Key Men 54
Geologists to Make New Uses of Old Oil-Finding Tools 56
OPA Completes Subsidy Plan; Sent to Vinson 58
Deaths in the Industry 58

Trends 47
This Week 51
Editorial 55
Refining News 113
Pipe-Line News 117
Natural-Gas News 121

ENGINEERING-OPERATING

Continental Uses Central Metering and Separator Batteries 61
British American Refinery Embodies Latest Developments 64
One-Man Valves for the Little-Inch Pipe Line 76
Soda-Methanol Reagent Removes Mercaptans Quantitatively 82
Dual Completion With Crossover Packer in Dorcheat Pool 93
Servicing Fuel-Injection Nozzles 97

Plant Practices 86
Questions on Technology 90
Cost Engineering 107
Journalog 109

EXPLORATION AND DRILLING

Week's Highlights 123
Completions in All Fields 123
Daily Average Production for Week 124
Reports by Areas Start on Page 124
Weekly Wildcat Completions and Discoveries 139
February Completions Increase 6 Per Cent 139

ADDITIONAL FEATURES

Drilling Contractors 140
Personals 142
Market Developments 145
Refinery Price Summary 145
Equipment Progress 146
Classified Advertising 148
Calendar of Events 152
Advertisers' Index 152

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the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 124

CRUDE-OIL STOCKS 236,119,000 bbl. as of March 18 down 629,000. One year ago 238,417,000 bbl.

GASOLINE STOCKS 86,185,000 bbl. as of March 18—down 374,000. One year ago 94,477,000 bbl.

RESIDUAL FUEL-OIL STOCKS 51,010,000 bbl. as of March 18—down 352,000. One year ago 68,299,000.

GAS OIL AND DISTILLATE STOCKS 31,808,000 as of March 18—down 897,000. One year ago 32,933,000.

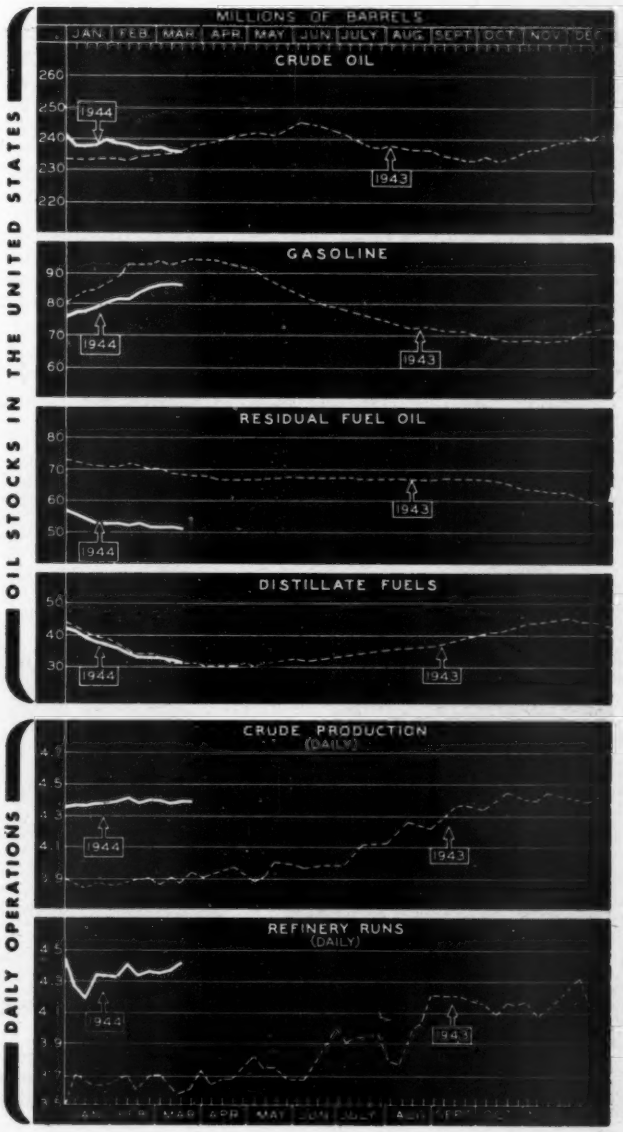
CRUDE-OIL PRODUCTION 4,386,550 bbl. daily average week ended March 25—down 5,038 bbl. Year ago 3,912,170.

REFINERY RUNS 4,437,000 bbl. daily week ended March 18—up 50,000 bbl. One year ago 3,592,000.

THE critical manpower situation was stressed last week at the annual meeting of the American Association of Petroleum Geologists and affiliated organizations in connection with the search for new oil. Reports in this issue explain other features of the shortages which have a direct bearing on what the petroleum industry will be able to do in all divisions of operations over the remainder of the year.

AS reflected in requests for additional employes there is no division in which the manpower situation is more serious than in those operations concerned with the refining of war products. A recently completed report showing conditions in the manufacture of 100-octane gasoline indicates what will be required in skilled manpower over the rest of the year. This report shows that approximately 70 refineries are now operating 115 units which contribute directly to the production of high-octane gasolines. This does not include a number of small plants manufacturing components used in blending the high-octane material. Since the first of the year the following large units have been completed: Alkylation, 12; catalytic cracking, 11; fractionation, 1; hydrogenation, 2; reforming, 1; cumene, 1; isomerization, 1. These figures include units installed at refineries in the Middle East, Netherlands West Indies, and Canada.

DURING the remainder of the year 69 additional units are to be installed in the Allied countries, including 3 in the U.S.S.R. The total capacity of these new units will about equal the output of the installations now in operation. The division of the major units to be completed during the next 9 months is: Alkylation, 24; catalytic cracking, 27; superfractionation, 1; hydrogenation, 3; isomerization, 13; butylene, 1. These units will come on stream from month to month, with all scheduled to be in complete operation by January 1, 1945. With few exceptions the companies concerned do not have adequate manpower at their refineries or in prospect for these new units and at the same time to maintain present operations. There are reports of loss to the military of key men who had deferments until the recent tightening of regulations. A special effort will be made to assure that there is no further drain on manpower to operate these units. The same situation applies to the butadiene plants now coming on stream or scheduled for completion within the next 90 days.



Principals in Foreign Oil Policy Dispute Preparing Cases for Inspection of Senate

by Henry D. Ralph

WASHINGTON.—No developments in the controversy over the United States oil policy in the Middle East are expected during the next week or two while the principals to the controversy build up their cases for presentation to the special Senate committee which is preparing to go into all phases of the subject.

This committee of 11 senators has had only one meeting for organizational purposes, and selected as its chairman Sen. Francis Maloney of Connecticut. Maloney, who represents a nonoil producing state, headed a special investigation of the East Coast oil shortage 2 years ago and is generally familiar with the oil industry.

The committee has a fund of $25,000 for its investigation which it may use in employing a staff and for travel of witnesses. A subcommittee consisting of Senators O'Mahoney, Brewster and LaFollette was appointed to a counsel and staff for the investigation, and no hearings are expected to be scheduled until this organization has been completed. Secretary of the Interior Ickes, who probably will be one of the first witnesses, will be away from Washington for the next week or 10 days on a vacation.

PRC Attracts Top Interest

While the committee is directed to go into all phases of our national foreign oil policy, it probably will give its first attention to the plan of the Petroleum Reserves Corp. to construct a crude-oil pipe line across Saudi Arabia under contract with the Gulf Exploration Corp., The Texas Co., and Standard Oil Co. of California. This probably means that no further action will be taken toward effectuating this project during the investigation, since neither Ickes nor the companies are expected to sign a definitive contract under the circumstances.

It now appears that the Army and Navy, particularly the Navy, will be the chief defenders of the Arabian deal, primarily on the ground that it will provide a reserve for future wars, though Navy Secretary Knox last week defended the pipe line as necessary for the present war. Aside from Knox's press conference statements neither department has taken any official stand, but Army and Navy men privately keep putting out the thought that domestic reserves are running short and this Government should take immediate and aggressive steps to assure itself of large supplies of petroleum in the ground for any future contingencies.

The military interest in the Middle East apparently was aroused by the report of the DeGolyer mission which PRC sent to that area and which was enthusiastic over the probable size of oil reserves around the Persian Gulf. DeGolyer's report was finally released by Ickes without comment last week after it had had considerable circulation within the Government, and it appears to be the source of much of the information which military officials have been quoting.

Meanwhile, odds mounted that the PRC will not have a chance to carry out its Saudi Arabia pipe-line project.

Mounting public interest, most all of it hostile or at least suspicious, is quite evident as the implications and possible future foreign entanglements become better understood. A series of developments made it appear that the three American oil companies concerned probably will not sign the contract drafted by PRC until after the Senate investigation, and also that the investigation may well result in action dissolving PRC or greatly limiting its activities.

Senate committee membership is: From the foreign relations committee, Senators Connally of Texas and Vandenberg of Michigan; from interstate commerce, Johnson of Colorado and Moore of Oklahoma; from the commerce committee, Maloney of Connecticut and Brewster of Maine; from public lands, O'Mahoney of Wyoming and Gurney of South Dakota; from the Senate at large, Lucas

Acme Photo

Sen. Tom Connally of Texas congratulating Sen. Francis Maloney of Connecticut on the latter's election to head the special Senate oil-investigation committee which will open hearings in April on the entire foreign-petroleum policy with particular emphasis on operations of the Petroleum Reserve Corp.

of Illinois, Maybank of South Carolina, and LaFollette of Wisconsin.

E. Holley Poe resigned as executive vice president and general manager of the PRC on March 15. He gave as his reason that he desired to return to the natural-gas business.

Secretary Ickes, president of PRC, said that the work of this office has not been completed and that he has in mind the appointment of another man to this post but is not yet ready to announce it.

The resignation of Poe caused something of a sensation. Poe left the position of director of the Natural Gas and Natural Gasoline Division of the Petroleum Administration for War to become the first employe of PRC, and he drafted the Arabian pipe-line construction contract which is now before the three companies for signature.

Poe Silent on Resignation

Poe declined to discuss PRC affairs or the circumstances leading to his resignation on the ground that he probably will be called to testify before the Senate committee, but he denied that he is quitting under fire or because of any specific controversy with Ickes. However, friends say that Poe went into PRC in hopes of making a constructive contribution to the development of a foreign oil policy but feels that he has been frustrated and relegated to a minor role. Poe was said to have had no part in formulating policies and even to have been unable to determine what policies PRC was following. It is believed that Poe disapproved of Ickes' method of proceeding without consulting American oil interests and in the face of the expressed opposition of the oil industry, and that he was not enthusiastic about the pipe-line project for which he was ordered to draw a contract.

The Navy Department appears to be laying an escape on the unequivocal endorsement of the PRC Arabian project previously given by Secretary Knox. About a week ago Under Secretary of the Navy James Forrestal discussed the subject of Arabian oil off the record at a press conference.

It is understood he said that the Navy is not necessarily committed to the details of the PRC pipe line proposal but is vitally interested in seeing that the United States permanently has access to adequate petroleum reserves. Because reports indicate that domestic-oil reserves are dwindling while those of the Persian Gulf region are probably the greatest in the world, the Navy wants a policy of cooperation between the Government and the American oil industry to develop Middle East petroleum and make it readily available to the Navy at all times in the future. The Navy was represented as feeling that it is unfortunate that the PRC's approach to the problem caused so much suspicion and distrust and that perhaps a new solution should be attempted. One suggestion thrown out for discussion was the creation by Congress of a new government corporation, with powers and objectives clearly defined, headed by a prominent oil-industry executive. This corporation would assist American oil companies operating abroad through financial, technical and diplomatic means, and because of its official status could negotiate concessions and agreements with foreign governments. The Navy is said to be particularly interested in proposals to import and store large quantities of petroleum as an above-ground war reserve.

Soviet Advance Pointed at Nazi Oil Supply in Rumania

by John P. O'Donnell

NEW YORK.—Rapidly moving Soviet armies have reached the Prut River, the western border of Bessarabia, and in doing so have posed a threat to the principal German oil supply that is more serious than any the Nazis offered to the Russian oil fields even at the height of their penetration of the Caucasus. When the Germans reached the outskirts of the Grozny field they were still 300 miles from Baku and the almost impassable Caucasian Mountains were between them and their goal. By reaching the Prut, Russian armies are less than 250 miles from Ploesti and no mountain range intervenes.

While communiques were not specific, the Russians evidently reached the Prut in the vicinity of Balti. From that city to Bacau, northernmost of the Rumanian oil fields, the distance is approximately 100 miles. The distance from Balti to Ploesti, skirting the eastern extremities of the Transylvanian Alps, is approximately 235 miles.

The importance of Rumanian production to Germany and consequently the severity of the threat which the Russian advance implies is apparent from the fact that it constitutes approximately 70 per cent of the non-synthetic petroleum production available to the Nazis. It is estimated that output of German occupied countries, including Hungary and Rumania, is in the vicinity of 140,000 to 150,000 bbl. per day. Rumania has been contributing about 100,000 bbl. of this total.

Rumania's principal fields are in the districts of Prahova and Dambovita, north and west of Ploesti, which is the center of oil-producing activities. There are also several small fields in Buzau, a short distance northeast of Ploesti, and five small fields in the vicinity of Bacau. The production of all the fields outside the Dambovita-Prahova area was, before the war, fewer than 2,000 bbl. per day so that no serious loss will result to the Germans until they lose the Ploesti fields.

The Ploesti fields extend for a distance of almost 60 miles from the Copaceni-Matita area in northeastern Prahova to the fields around Targoviste in central Dambovita. There are approximately 40 of them and the majority are very small. Only 10 have an area of more than 1,000 acres. Moreni, on the Dambovita-Prahova border, is the principal field, followed in order by Baicoi-Tintea, Boldesti, Ceptura, Gura Ocnitei and Buscani. The last two are in Dambovita and the others in Prahova.

Two Rivers Block Path

In order to reach Ploesti, Russian armies would have to cross two rivers, the Prut and the Siret, both branches of the Danube. While the Transylvanian Alps offer protection from the north, the eastern approaches to the oil-producing area are wide open. However, it is certain that the Germans will put up their stiffest defense in the 150-mile gate between the mountains and the Black Sea on the Siret and Danube. According to reports, they are fortifying the area heavily in addition to concentrating all available transportation on the movement of oil from Rumania to Germany before the Russian noose tightens.

This traffic may already have been reduced for the Russians are in the vicinity of the Ploesti-Cernauti Railroad over which a good portion of the Rumanian oil probably passed. It would cease entirely with the fall of Ploesti itself for all lines of transportation from the district originate in that city. This includes east, north and south-bound rail lines as well as pipe lines to the Black Sea port of

Constanta, the twin line to the Danube port of Giurgiu and along the line the Germans are reported to have constructed to a point above the Danube's Iron Gate, as well as the short line to neighboring Campina.

Russian armies in eastern Poland are an even more immediate threat to the Galician fields. These fields are minor compared to those in Rumania. However, their production, which in immediate prewar months averaged slightly in excess of 10,000 bbl. per day, is a volume of consequence in an area so lacking in petroleum production as is central Europe.

The Polish producing areas are: Boryslaw, Jaslo and Stanislawow, in order of their importance. Boryslaw accounted for about half of Poland's production in the prewar years, but it had been steadily declining for years and may have continued to fade after the occupation. This decline was offset by the continuing increase in Jaslo production.

Railroad Center Threatened

At the time of writing, the Russians were threatening Tarnapol, a railroad junction just inside the Polish-Russian prewar border. The distances from Tarnapol to the various producing areas are: Stanislawow, 60 miles; Boryslaw, 100 miles, and Jaslo, 180 miles. The three Stanislawow fields, Rypne, Majdan and Bitkow-Pasieczna, are 25 miles southwest of the town of that name, the Boryslaw field is 5 miles southwest of Drohobycz, and the Jaslo fields are scattered over an area of 65 miles from Gorlice-Lipinki in the west to the Wankowa field in the east.

If Russia captures the Stanislawow and Boryslaw areas it will be the second time during the war that she held them. Both are in the eastern part of Poland that was given to Russia when she and Germany divided that country after its conquest in the first days of the war. This possibility is likely to result since all of them are on the eastern side of the Carpathians, the first natural defense line the Germans have south of the Pripet marshes.

Loss of the Rumanian fields would be a severe blow to Germany and would be a major economic victory for the Russians since it would force their enemies to rely almost entirely on synthetic production. These synthetic products have been surprisingly satisfactory, particularly the aviation gasoline which has been found to have octane values in the vicinity of 90 plus high power-output qualities. This is offset by the limitation on quantity which, with the remaining natural petroleum production and stocks which have been accumulated, would probably be insufficient to supply all the requirements of a nation fighting on as many fronts as Germany is now.

Refiners Warned of Trend to Socialization of Government

by Arch L. Foster

ST. LOUIS.—Members of the Western Petroleum Refiners Association here March 28 for their annual meeting heard warnings of the trend toward socialized government and heard representatives of the Petroleum Administration for War outline plans for relieving the District 2 crude-oil shortage and the critical manpower situation.

Bruce K. Brown, assistant deputy petroleum administrator, predicted that the refinery shutdowns for routine inspection and maintenance would be extended 10 days to 2 weeks beyond normal because of the drain on manpower. This he said would result in a 5 per cent decrease in processing deficiency.

"The use of Victory as a pretext," said C. L. Henderson, president of the W.P.R.A., "for speeding our pace toward a regimented or socialized economy or extending dictatorships of martial law into postwar America would be a perversion and a betrayal of all for which our fathers fought." Our situation is serious, Henderson pointed out, and we are right in being alarmed at it. Broaching the subject of foreign oil and the development of American interests in foreign oil supplies, Henderson declared that "we must seriously consider whether American private enterprise and capital can be preserved in partnership with governmental agencies or under their domination."

Henderson was renominated for the W.P.R.A. presidency. R. L. Tollett, Cosden Oil Corp., Big Spring, Tex., was made vice president. New directors are J. W. Vaiden and W. G. Skelly, Skelly Oil Co., Tulsa; W. F. Sims, Panhandle Refining Co., Wichita Falls, Tex., and F. H. Dunn, Wilcox Oil & Gas Co., Tulsa. Other officers and directors were reelected.

Because this is now a seller's market, the president stated, we cannot allow ourselves to be laggard in consideration of our relations with customers. Good public relations work now will help matters when the situation changes.

Taxes are approaching the confiscatory stage, Henderson implied in outlining that difficult situation. More than 165,000 federal, state and local taxing agencies are in existence, and the "cut" these take from the oil man's gross income and from the customers' pockets in total is greater than the price the oil producer receives for the crude, he stated.

"Postwar expansion in our branch of the industry will no doubt be rather slow, due to lack of capital brought about in the main, by high taxes," Henderson said.

He believes that the postwar octane race may not be quite as rapid as many are inclined to think, especially since the equipment will not be immediately available and motor-car replacement will require a considerable time.

Policy Called Short Sighted

Henderson decried what he considers the short-sighted policy of the Government in refusing increased prices for crude as a direct stimulus to exploration and the expansion of our producing reserves. He believes that had the Government officials been less concerned with the visionary projects of theorists and had relied on the advice of practical, experienced oil leaders our present position of diminishing reserves would have been corrected. As to inflation, "no inflation takes place so long as prices are below parity," he said, and continued that he believes the public will be glad to pay higher prices for gasoline, etc., in order to assure an adequate supply of crude for the future.

The possibility that desirable refinery crude oil from Texas will be available to District 2 plants currently short of charging stocks was advanced by W. W. Vandeveer, Chicago, director in charge of District 2 for the Petroleum Administration for War. He raised the prospect that excess stocks in Texas might be diverted to Middle West refineries, pending completion of additional 100-octane plants currently under construction at several Texas points. The only long-term and semipermanent relief from the District 2 crude-oil shortage held by Vandeveer to be open, however, was expanded utility of sour crudes from West Texas.

He contended that movement of Texas stocks to District 2 refineries could be handled by the tank cars which will be made available for

(Continued on page 58)

THIS WEEK

DRILLING—Reduction in drilling, already 24 per cent behind projected pace, will occur unless key men are deferred. . . . Current lag behind PAW recommendation about equals reduction in rig efficiency resulting from previous manpower drains. . . . ¶Possibility of losing all men under 26 brings prediction of another 25 to 30 per cent drop. . . . Industry frankly admits it will not achieve goal of 24,000 wells, or even come close, unless manpower drains are stopped, and reversed. . . . ¶World's drilling-depth record broken by Phillips Petroleum Co. well in Pecos County, West Texas. . . . ¶Despite failure to attain first quarter goal, completions through March 25 are up 23 per cent from 1943 record. . . .

TRANSPORTATION—Deliveries gradually approaching capacity through WEP 20-in. products line. . . . ¶Upwards of 5,000 tank cars being replaced by product-line shipments to East Coast. . . . ¶Industry and PAW working on assignment of relinquished tank cars to crude-oil service between Texas and District 2 refineries. . . .

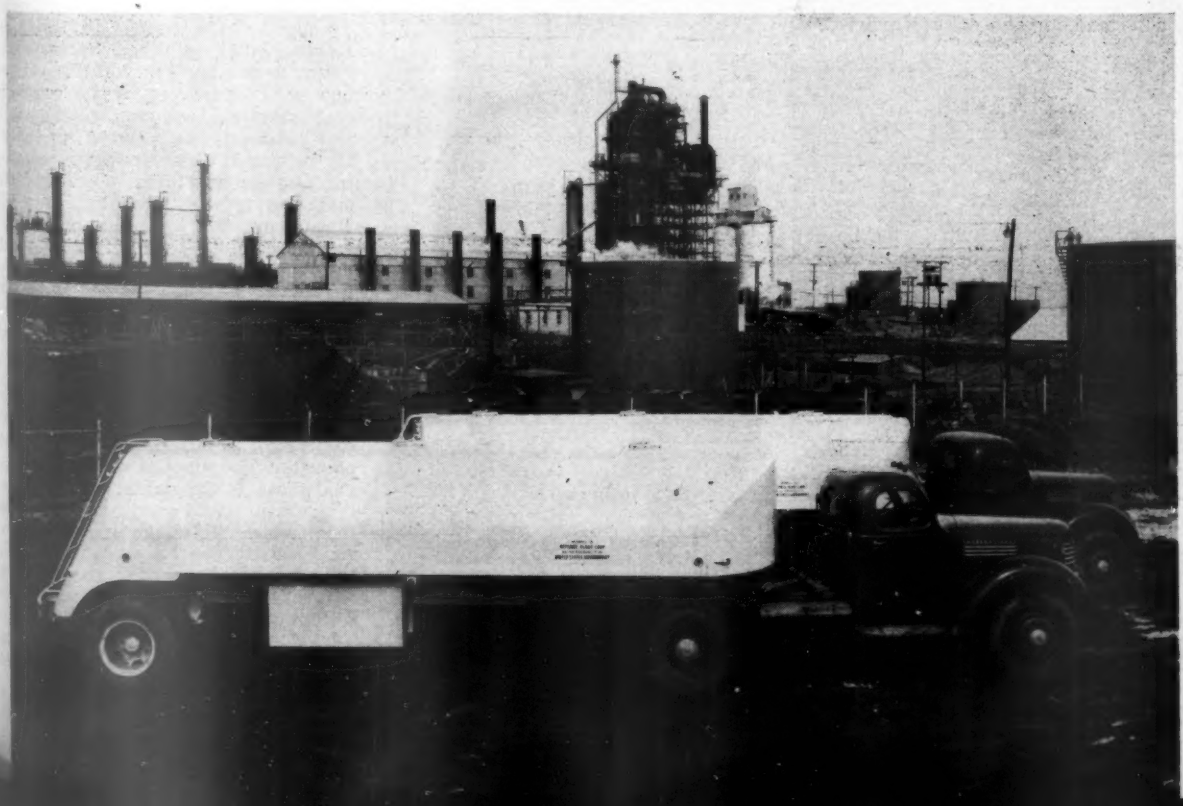
SUPPLIES—Petroleum Administrative Order 1 may be applied to all districts. . . . It would prorate products to like classes of consumers on equal basis by trade areas. . . . ¶East Coast supply position improving. . . . Record volume of crude and products, 1,790,960 bbl. daily, delivered to Atlantic seaboard for week ended March 18. . . . ¶More desirable refinery crude from Texas may be diverted to District 2 plants, pending completion of coastal 100-octane units. . . .

MATERIALS—Engine repair parts most critically short items currently bothering contractors. . . . ¶Conditions easing on drill pipe, drill collars, rock bits. . . . ¶Completion of landing-craft program, now relatively near, will free much compressor-manufacturing capacity. . . .

REFINING—Associated Refineries, Inc.'s new 100-octane plant at Duncan, Okla., soon to be in full operation. . . . Fifty tank-truck trailers are engaged in delivering charging stock from eight participating refineries. . . . Trucks deliver gas-oil charging stock, return byproducts. . . .

FOREIGN—Russian armies threaten Nazi oil supply in Rumania. . . . Stalin forces about 200 miles from Ploesti, chief Rumanian producing and refining center. . . . Reds much nearer some of smaller fields. . . . ¶Principals in Arabian pipe-line controversy preparing cases for presentation before Senate committee. . . . Odds increasing that Arabian line will not be built. . . . No definitive contracts in prospect until after Senate hearing. . . . Probably no action of any sort until situation is clarified. . . . ¶Petroleum Reserve Corp. finally releases preliminary report by DeGolyer committee which was leaked earlier through Navy Department. . . .

Part of the fleet of 50 tank-truck trailers assigned to the vital transportation job of moving charging stock from eight participating refineries to the 100-octane plant completed at Duncan, Okla., for Associated Refineries, Inc. The trucks return byproducts resulting from the 100-octane plant operation to the contributing refineries



Technical Papers Draw Large Crowds to A.P.I. Pacific Coast District Meeting

by L. P. Stockman

LOS ANGELES.—The Pacific Coast district, Division of Production, A.P.I., climaxed the 1944 spring meeting here March 23, with a dinner meeting at the Biltmore Hotel following which members elected W. L. Jarvis of The Texas Co. chairman for the coming year. The attendance exceeded expectations and after 950 tickets had been sold for the evening dinner session, the hotel advised the arrangements committee it could not serve any more. Otherwise the attendance would have greatly exceeded past records.

Attendance at the morning and afternoon technical sessions amply filled the Biltmore ball room which normally accommodates 750 persons. At the evening session, presided over by Carlton Beal, the retiring chairman, J. R. Pemberton, consulting petroleum engineer and former California oil umpire, discussed the present oil situation in California and what should be done about it.

Simultaneous with the election of Jarvis, Paul Andrews of Signal Oil & Gas Co. was elected vice chairman for Los Angeles Basin and W. K. Kreiger of Richfield Oil Corp. was elected vice chairman for the coastal district. At a meeting in Bakersfield, preceding the spring meeting in Los Angeles, George O. Suman of Tide Water Associated Oil Co. was elected vice chairman to fill the unexpired term of his predecessor who passed away a few weeks ago. At the meeting in Los Angeles, Suman was elected vice chairman for the San Joaquin Valley for the coming year.

J. R. Pemberton, former California oil umpire when the state had many flush fields, was the guest speaker. He stressed fuel utilization and charged that the present administration had failed to extend hydroelectric power to offset consumption of natural gas which has become acutely short. He also thought California should have some kind of a control bill and one that would meet with general approval. This was necessary, he charged, because the Petroleum Administration for War intends to take over control of the oil industry after the war under the guise of conservation. "There is not one single thing the Government can do in the oil industry that private industry cannot do better and this muscling in on the oil business must stop," said the speaker.

This summary of technical discussions and other occurrences at the Pacific Coast district, Production Division, A.P.I. meeting will be supplemented in the April 6 issue with the complete paper on "Drilling Fluid for the Completion of Shallow Wells." A brief summary of the paper contained in this report shows that the authors, W. H. Farrand and W. A. Clark, engineers for The Texas Co., Los Angeles, have reached basic conclusions on the types of drilling mud which yield the best completion results under various types of reservoir conditions.

The morning technical session, the honorary chairman of which was E. V. Watts, chairman of the California topical committee on production practice, featured four technical papers and one dealing with oil development on the public domain. The technical paper on Pressure-Volume-Temperature and Solubility Relations for Natural Gas-Water Mixtures by C. R. Dodson and M. B. Standing of Standard Oil Co. of California, La Habra, Calif., described work undertaken to provide data on natural gas and water mixtures in the reservoir and pressure, volume, temperature and solubility data were presented for mixtures of natural gas and water and for mixtures of natural gas and two typical oil-field brines. It was found the solubility of natural gas in connate or interstitial water may amount to as much as 20 cu. ft. per barrel at 5,000 lb. per sq. in. in the temperature range of oil reservoirs and the solubility of natural gas in brine decreases with increasing total-solids content. The compressibility of a saturated liquid phase is increased about 18 per cent by the solution of 20 cu. ft. of gas per barrel of water. The amount of water in the gas phase is dependent on pressure, temperature, and salinity of the brine from which the water was vaporized. At 5,000 lb. per sq. in. and 200° F., the concentration of the water in the natural gas amounts to approximately 0.6 bbl. per 1,000,000 cu. ft. of dry gas.

The paper on Development and Production Performance of the Por-

W. L. Jarvis, development engineer for The Texas Co., Los Angeles, new chairman of the Pacific Coast district, production division, A.P.I.

James G. Creed, Halliburton Oil Well Cementing Co., Los Angeles, who was chairman of the committee which arranged the meeting

ter Reservoir, Aliso Canyon field, by G. C. Pfeffer and A. C. Tutschulte of Tide Water Associated Oil Co. indicated the application of modern engineering practice. This paper was so well received, involving as it did a field about which very little is known, that several subsequent speakers complimented the authors and the company for making the data available. The paper was prepared in two parts, the first covering drilling operations and the second covering production practice. In producing the Porter pool, the primary objective has been to secure maximum utilization of energy by withdrawals on the basis of the reservoir-pressure pattern. Since pressure volume, temperature relationships, hydrocarbon analyses of the reservoir oil, and analyses of the gas should be obtained in order to enable the operator to understand the producing performances and future behavior of an oil reservoir, a bottom-hole sample of the Porter zone reservoir was taken early in its producing life. This test indicated that in the portion of the reservoir drained by the well in which the sample was taken the solution gas-oil ratio was 333 cu. ft per barrel; the saturation pressure of the oil and this quantity of gas was 1,644 lb. per sq. in., and the formation volume factor under these conditions was 1.197. The productivity indexes of the majority of the Porter zone wells, which were determined relatively early in their producing life, varied from 0.4 to 4.3 bbl. daily per 1 lb. sq. in. of pressure differential and averaged 2.2.

Production Schedule Followed

The operator, subsequent to discovery of the field, completed a withdrawal schedule taking into consideration drainage, producing-sand thickness, gas-oil ratio and bottom-hole pressures. In accordance with this schedule, field production was increased from 1,500 bbl. daily to 2,250 bbl. in November 1940, and was increased to 3,000 bbl. daily during the early part of 1941. By July 1941, however, the gas-oil ratio of the field had increased to 530 cu. ft. per barrel and the reservoir pressure declined from 1,620 lb. per sq. in. on December 31, 1940, to 1,519 lb. on June 30, 1941. Because of this performance, production was reduced to 2,000 bbl. daily in July 1941 and maintained at that rate for the balance of that year. In December 1942 production was reduced to 1,800 bbl. daily and was further reduced to 1,500 bbl. daily in June 1943. It has been the aim of Tide Water Associated in producing the pool to operate at as an efficient rate as is practical for the realization of maximum economic oil recovery within reasonable time limits. The Aliso Canyon field is about 30 miles northwest of the center of Los Angeles. The Porter reservoir is wholly controlled by this operator.

A. C. Tutschulte, Los Angeles basin district production engineer, and G. C. Pfeffer, Santa Fe Springs district petroleum engineer, both of Tide Water Associated Oil Co., who were coauthors of a paper on the Porter reservoir, Aliso Canyon field

A paper on the Determination of the Interstitial Water Content of Oil and Gas Sand by Laboratory Tests of Core Samples by J. J. McCullough, F. W. Albaugh, and P. H. Jones of Union Oil Co. of California research department, Wilmington, Calif., presented two methods for estimating the static distribution of interstitial water in oil and gas sands by laboratory tests of core samples. One involved the application of gas pressure and the other utilized centrifugal force. The data reported indicate the irreducible water saturation as determined in the laboratory by the gas pressure method is not far removed from the water saturation of reservoir sands above the transition zone. The more rapid centrifugal method for measuring irreducible saturation may have equal value but more work is required to establish this point. The methods outlined for measuring irreducible saturations and for determining pressure-saturation relations are still in the process of development and doubtless many improvements can be made. A combination of the electrical method for measuring saturation with application of pressure by gas offers promising advantages. Also limited work indicates gas pressure or an oil pressure method may be applied directly to determining irreducible saturations in fresh uncleaned cores. This paper was presented before the conclusions of work by the authors in the hope it would stimulate interest in this important problem and lead to improvements in testing methods and in the interpretation of data.

The damaging effect on oil sands of water filtrate from drilling mud has long been suspected and work done by The Texas Co. was the subject of a paper by W. H. Farrand and W. A. Clark of that company at Los Angeles. While most of the evidence comes from deep wells, the effect of this phenomenon on shallow wells has been under investigation for a number of years. The authors were of the opinion that oil is a fairly good completion fluid if it does not affect the shale and cause it to slough and run and further that salt water is apparently less harmful to the oil zone than fresh water. In actual experiments on oil sands at Coles Levee it was found a very material reduction in permeability occurred when fresh water was pumped into the oil zone and production rates in the Wilmington field have also been found to be lower when wells have been killed with water. Temblor zone wells at Kettleman Hills often lose their productivity when exposed to formational waters Favorable results of fluids other than water-base muds are indicated by many examples of good well completions but the final evaluation must be deferred for further study.

The afternoon technical session with Jarvis presiding and assisted by Farrand, chairman of the topical committee on drilling practice, featured a paper on water-flooding operations in Kansas by R. C. Earlougher of Geologic Standards Co., Tulsa, supported by papers on Load Problems of a Natural Gas Utility by H. P. George of Southern California Gas Co. and People and Petroleum by R. E. Allen, A.P.I. director of public relations. Because of its probable early application in California, Earlougher's paper on water flooding attracted a large audience. The discussion following this paper indicated California operators are not at all convinced that water flooding operations will be feasible in most California fields.

Industry Urged to Take Steps for Deferment of Key Men Through PAW

by Henry D. Ralph

WASHINGTON. — The Petroleum Administration for War may be designated as the agency to endorse special requests for draft deferment of key men in the oil industry. Anticipating assignment of higher authority in deferment questions, PAW has broadcast to the industry information on the exact steps which must be taken and the data which must be supplied in order to enable the agency to endorse requests for deferment.

It appears likely that a total quota of draft deferments for key men under 26 years of age will be allowed for all industries and that PAW will be made a "claimant agency" for the petroleum industry's quota under this industry allocation.

Specific Steps Outlined

The following steps are necessary, according to PAW, to obtain that agency's assistance on draft exemption for men under 26 in the fields of production of oil and gas, including exploration, development and servicing:

1. Prepare and file three copies SS Form 42A (special) with the state director of selective service, setting forth in detail the nature of the occupation, qualifications, irreplaceability, etc., of each registrant.

2. Send one additional copy of above completed form to the labor counselor, PAW, Room 6640, Interior Building, Washington.

3. Submit to labor counselor, PAW, two copies of a "company certification" applying to all men for whom Form 42A (special) are submitted. This "company certification" must be signed by an officer of the company who will assume special responsibility for the statements contained therein. The certification must state that the individual is employed 48 hours or more per week and cannot be replaced by others presently engaged on nonvital programs who are not vulnerable to the draft, or cannot be replaced by recruiting.

4. If a "replacement schedule and summary" have been filed with the state headquarters of selective service, a copy of such schedule and summary must be sent to the PAW labor counselor.

PAW cannot act on any case until the specific steps are taken. Ability to retain key men will depend in part on speed with which the steps are made. All men under 26 will be given preinduction physical examinations immediately, but notice of such action does not in any way imply that induction is thereby ordered.

PAW has set following standards which must be met for indorsement by that agency:

"Technically trained personnel, holding college or university degrees in science or engineering, or the equivalent experience as defined by the critical list of occupations, who are actually engaged in jobs shown on the critical list, and who are employed to the highest degree possible, their technical training in occupations contributing directly to furtherance of the production program."

Drilling Operations Face Drastic Curtailment

HOUSTON.—Drastic curtailment of drilling operations threatens the oil industry if the present rate of drafting men under 38 continues, according to a report adopted by the production committee of District 3, Petroleum Administration for War. The report, prepared by a manpower subcommittee, was submitted to the committee at an open meeting of 200 Texas and Louisiana oil men. The report added:

"About 27,000 men are needed to continue to operate present rigs and to expand operations to meet PAW schedules. The industry is 25 per cent below PAW's schedule of 24,000 wells to be drilled this year."

PAW was urged to act as intermediary with selective service headquarters in each state "so as to give greater weight to replacement schedules filed by industry." The report asked that the War Manpower Commission advise PAW of contemplated cutbacks in other war industries in advance so that drilling and production could carry on a recruitment program.

Illinois Supreme Court Kills State's Production Tax

SPRINGFIELD.—The 3 per cent oil-production tax, under which $9,500,000 had been paid into the Illinois treasury since July 1941 was invalidated last week by the state Supreme Court, which found that the law was not of uniform application.

The court ruled that the act attempted to tax royalty owners as engaged in oil production, when many are not so engaged. The levy is intended to be an occupation tax, "yet it manifestly is not a fact that such royalty owners are in the business of producing oil any more than a stockholder by accepting the dividends from a corporation is in the corporate business."

The tax had been challenged by various oil firms, including Ohio Oil Co., Superior Oil Co. and Shell Oil Co., Inc. Their complaints were dismissed in Sangamon County Circuit Court. The lower court's decree was reversed and remanded with directions to enter an order in favor of the oil producers, who had sought to recover amounts paid.

New World Record for Deep Well Now Held by Phillips

Phillips Petroleum Co. now holds the world's record for the deepest well ever drilled, with a total depth of 15,009 ft., and still drilling. Phillips 1 Ada C. Price, 1,980 ft. from the north and west lines of Section 11, Block 101, TCRR Survey, Pecos County, Texas, passed the old world's record of 15,004 ft. and will continue to drill, if possible, until a thorough test is made of the Ordovician.

The old record of 15,004 ft. has been held since 1938 by Continental Oil Co. KCL A-2, in the Wasco field, Kern County, California.

Phillips' new world record holder is about 27 miles southeast of Fort Stockton, Tex., and about 35 miles south and southeast of the Apco-Warner pool, which produces from Ellenburger at approximate depths of 4,550-80 ft.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

The Matter of Taxes

THE dominant part played by taxes in the operations of large and small oil companies is revealed in statements covering last year's operations now being made available to stockholders. While there is no disposition to complain regarding the war levies, economists are pointing out that it will be impossible for managements long to maintain well-balanced operating positions with the present disproportionate tax charges accentuated by frozen prices for crude oil and products.

The tax situation is apparent from the 1943 report of one of the larger operating units whose net crude-oil production was about equal to its refinery crude-oil runs to stills and which distributes a large part of its gasoline through company-owned or controlled facilities.

This company paid direct taxes and income taxes amounting to $1.13 per barrel on its crude-oil production. It paid another $1.25 per barrel in special taxes on its products, a charge which exceeded the average posted price for its crude oil at the wells. The total taxes paid by this operator were 4½ times its net earnings and more than 6 times the payments to stockholders. They were nearly double the wage payments to employes. The 1943 increase in income taxes alone amounted to more than 20 cents per barrel of crude oil produced and refined.

This is not an exceptional case, but is representative of the present tax load in finding, producing, transporting, refining and marketing a barrel of crude oil in this country. Reports of all classes of operators reveal that a large part of all of the increased earnings of 1943 over 1942, due largely to greater volume, were generally eaten up by greater taxes.

What this means is that payments to taxing agencies, rather than to owners or employes are the controlling factor in operations. President Henderson at the annual meeting of the Western Petroleum Refiners Association Tuesday took cognizance of this situation when he said: "Taxes, present and proposed, are a problem to an already overtaxed industry. More than 165,000 federal, state and local taxing authorities are in existence, and they take their cut from the industry to the extent that the taxes collected on refined products of one barrel of crude oil are greater than the price received by the producer for that barrel of crude oil."

It is impossible to project a healthy industry and assume a continuance of anything approaching present tax rates. The normal charges have been advanced to the point where tax payments must receive first consideration in all planning. The so-called excess profit levies in effect amount to confiscation by the Government of those funds which reflect unusual competence and from which come the hazard capital on which the oil industry must be based in the future as it has been in the past.

Obviously higher prices for crude oil and products are not in themselves an answer to this problem. They would be of aid to the industry at this time, particularly to those operators who are not participating in any of the war emergency operations and whose costs are constantly rising in the face of fixed or declining revenues. Present taxes go deeper than these current problems of inadequate returns. Continued after the war they could only be paid by what would be in effect a liquidation of the petroleum industry.

Geologists Prepare to Make New Uses of Old Exploration Tools in Oil Finding

by Charles J. Deegan

DALLAS.—A record-breaking attendance, wartime conditions considered, of grimly serious geologists, geophysicists and paleontologists marked the joint sessions of the American Association of Petroleum Geologists, Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists. Faced with the wartime responsibility of bolstering weakening oil reserves, they came to the convention to compare notes and see if they could find the answer to questions that were bothering them.

After 3 days of hard, often grinding work they found that there was no hope that radar or any other wartime invention would furnish them a magic tool by which their problems could be solved. They learned that their manpower problems might well be aggravated seriously by developments in draft regulations affecting scientists and technicians under 27 years of age. Furthermore they found that among their old and accepted tools and techniques for exploration work there were no startling new developments; only the usual steady progress in improvements. The general conclusion was that all old tools and techniques must be examined thoroughly and improved in every way possible as rapidly as manpower and time permit. There will be a searching examination this year of the scientific field for possible tools among those things on which piecemeal work has been done for years. The hope is that this will be the year in which some one will find one more piece of the puzzle that will permit the separate parts to mesh finally into a practical working tool for exploration.

An informal discussion of the geology and oil potentialities of the Near East by E. DeGolyer revealed that the drilling of not more than 150 wildcat wells in that area had developed potential reserves about equal to those of the United States.

DeGolyer's talk was confined wholly to the geology and producing potentialities of the area.

Research Meeting Well Attended

Interest in the question of domestic reserves was evidenced by the very large attendance at the research committee session on estimating petroleum reserves. The various techniques were discussed at length and the effectiveness and extent to which new tools could be utilized in arriving at more accurate estimates of reserves was examined. The economic importance of accurate estimates of reserves was emphasized, particularly to those operators whose major investment is in production, rather than integrated operations involving large investments in transportation, marketing and refining facilities. It was pointed out that the major part of the value of the properties of these operators represented oil reserves and that therefore accurate estimates were essential to arrive at accurate financial statements.

There was a moderate revival of interest in one of the oldest fields of geochemistry, namely the study of connate waters. Reports from new areas indicate that connate water analysis can be used as an additional tool to find or check structures in many basins and at least some of the pioneers in this work still have faith that eventually they can find the key to determination of the proximity of oil in place from such analysis. At a minimum it seems likely to find a place as an additional working tool for finding structures.

Interest is increasing in two fields in which research is reaching interesting stages: (1) The examination of the radioactivity and organic content of sedimentary rocks; (2) new classifications of sedimentary rocks and some new fundamental theories about the relationship of certain types of sedimentaries (under the new classifi-

Standing is the new executive committee of the A.A.P.G., composed of R. E. Rettger, secretary-treasurer; Gayle Scott, editor; Ira H. Cram, president and Warren B. Weeks, vice president. Members of the retiring executive committee seated are R. W. Clark, Western Gulf Oil Co.; F. L. Aurin, past president; Cary Croneis, University of Chicago, and A. R. Denison, retiring president

cation) to the possibilities of finding oil fields. More research and further reports are expected to determine the possibility of either of these developing into a practical working tool for the exploration scientists.

The symposium on well spacing attracted a capacity crowd to hear the discussions of the advocates of wide spacing versus those of close spacing. While there was still a substantial divergence of opinion at the end of the discussion, the gap had narrowed considerably and there was general agreement that other factors than spacing alone had to be taken into consideration. Important data were presented to show the loss of relative oil permeability in the sand near the well when either gas or water was permitted to expand too rapidly and reduce the sand's oil saturation.

The paper on Trimetrogon mapping has been heavily censored by the War Department, but it was revealed that it permitted fairly accurate mass production of small scale aerial photographic maps, usually on a scale of 1 to 1,000,000, using relatively untrained personnel. It is not claimed to be sufficiently accurate for large-scale maps, such as most oil companies have obtained from aerial photography in the past. The accompanying slides indicated that it might well be a useful reconnaissance tool in the postwar period, particularly in sparsely settled regions with rugged terrain. Photographs are made from a plane usually at about 20,000 ft., in which three cameras are mounted, one vertically, two obliquely, giving an oblique overlap of about 60 per cent.

Structural details in some of the Trimetrogon slides gave visual explanation of DeGolyer's statement that although he had seen more anticlines in 30 days in the Persian Gulf area than he had in his whole previous experience, the reason might well be that he had never previously spent a month looking for anticlines at a speed of 180 miles per hour.

There was considerable private discussion among members about activities in Mississippi, Alabama and Florida. Interest in this area is continually increasing but very little information has been released for open discussion as yet.

NEW A.A.P.G. OFFICERS

Ira H. Cram, chief geologist, Pure Oil Co., Chicago, president.

Warren B. Weeks Phillips Petroleum Co., Shreveport, La., vice president.

R. E. Rettger, Sun Oil Co., Dallas, secretary-treasurer.

NEW S.E.P.M. OFFICERS

Donald D. Hughes, Stanford University, Stanford University, Calif., president.

Hershal C. Ferguson, consultant, Houston, vice president.

H. B. Stenzel, University of Texas, Austin, secretary-treasurer.

NEW S.E.G. OFFICERS

W. M. Rust, Jr., Humble Oil & Refining Co., Houston, president.

Henry Cortes, Magnolia Petroleum Co., Dallas, vice president.

W. Harlan Taylor, Petty Geophysical Engineering Co., San Antonio, secretary-treasurer.

Honorary life memberships in the A.A.P.G. were presented at the annual meeting by A. R. Denison, chief geologist for Amerada Petroleum Corp., and retiring president of the association (center), to W. E. Wrather, director of the U. S. Geological Survey, and C. E. Decker, University of Oklahoma, Norman. Charles N. Gould, director of the Oklahoma Geological Survey, was the third life member honored but he was unable to attend the annual meeting

Six Tankers Included in Vessels Assigned Russia

NEW YORK.—According to reports originating in London, the United States has transferred 22 vessels to Russia, including six tankers. Transfers made since January 1, 1943, are reported to include three tankers, the others having been transferred earlier. The latest tanker transfers reported were one of 10,509 deadweight tons, built in 1920; one of 9,830 tons, built in 1916, and one of 6,964 tons, built in 1919.

Last week witnessed the launching of the first replacement for the badly depleted Norwegian merchant fleet in this country. It was the tanker Hegra, built at the Chester, Pa., yards of Sun Shipbuilding & Dry Dock Co.

Also disclosed last week was the first evidence of the damage suffered by the tanker fleet of the United Nations. A report issued by Todd Shipyards Corp. revealed that it has "constructed, repaired or converted" 1,937 tankers during the war period. Of this total, 1,102 jobs were undertaken at the company's Hoboken, N. J., yards. Since comparatively few tankers have been built there, it is obvious that much of the work on the 1,102 vessels was repair work.

Arabian Pipe-Line Project Scored by J. Edgar Pew

DALLAS. — J. Edgar Pew, vice president of Sun Oil Co., in a statement given out here last week denounced the Petroleum Reserves Corp.'s Arabian pipe-line project as an extravagant waste of public funds and as a quick way to embroil America in war.

"Washington tries to justify the Arabian pipe line with the claim that crude-oil reserves in this country are failing. This is an excuse for the Government to go into the oil business. It is a misuse of the facts. If Washington is to step into the oil industry and other industries and operate and manage them and is to continue to build up government-owned and financed non-taxpaying competition to industries in this country, it will require several pentagon buildings to house such an administration."

Pew was in Dallas to visit Sun's southwest division headquarters.

OPA Completes Subsidy Plan, Recommendation Sent to Vinson

WASHINGTON.—Details of the Office of Price Administration's stripper well subsidy plan include a flat subsidy increase of 75 cents per barrel per well for Pennsylvania crude oil, it was learned here this week. The subsidy plan, submitted by OPA at the request of Director Fred M. Vinson of the Office of Economic Stabilization, is now under consideration by OES.

Basic proposals of the OPA plan provide an increased financial return on crude oil from fields averaging less than 9 bbl. per day per well. Payments are scaled as follows:

Thirty-five cents per barrel for fields averaging less than 5 bbl. per well per day.

Twenty-five cents per barrel for fields averaging 5, 6 and less than 7 bbl. per well per day.

Twenty cents per barrel for fields averaging 7, 8 and less than 9 bbl. per well per day.

The flat increase would apply to all Pennsylvania wells.

These increases, OPA believes, would prolong the operation of marginal wells and thus bolster the nation's crude-oil reserves. Under the proposal, the subsidy would be paid to the first purchaser of crude. The plan recommended does not contemplate any dealings between individual well operators and a government agency.

While the plan was submitted by OPA, it is not known if the plan is approved, whether administration of it would be handled by OPA or by another government agency.

Refiners Warned of Socialistic Trend

(Continued from page 50)

crude-oil shipments with completion of the War Emergency Pipeline, Inc.'s products line to the East Coast. When regular movement is established cars now hauling products to the East Coast will be used for crude oil.

Later, Vandeveer pointed out, a new loading rack at Cushing, Okla., will become available for loading tank cars from Stanolind Pipe Line Co.'s 16-in. line from West Texas. These combined facilities, he said, should serve to alleviate the crude-oil shortage at District 2 refineries. Previously, another speaker from the PAW staff at Washington, indicated that the federal agency is prepared to process applications for priority assistance on equipment which will be needed at most District 2 refineries in order to qualify them for operation with sour crude. Several Middle West refineries, however, reminded the PAW representatives that materials were just one side of the question. Economics, operators said, prevent them from even considering installation of expensive alloy tubes, exchangers and towers because of frozen product prices which are pegged to an entirely different set of conditions than now prevail.

Industry committees have established central recruiting offices in some areas under supervision of a competent personnel man loaned by operating companies, Vandeveer told the refiners as one new disclosure in what is being done about the manpower shortage.

"Through the offices of the PAW," he said, "arrangements were made with the War Manpower Commission and the United States Employment Service for field recruiters to interview applicants for jobs who apply at strategically located USES offices.

"Petroleum operators who desire help," he said, "make known their wants to the central office which, in turn, advises the recruiters who immediately take action to fill the requested need. The recruiters, being experienced and competent oil men, are authorized to hire, arrange for physical examinations and transportation to the point of work."

District 2 industry committees have a similar plan for recruitment under consideration, Vandeveer said.

He advised that Petroleum Administrative Order 1 is being actively discussed with the industry through marketing committees in all districts. Refiners were told that when the order becomes effective, products furnished to like classes of consumers by suppliers will be prorated on an equal basis by trade areas. Each supplier will take care of his customers as of a given reference period.

DEATHS

Sgt. Lawrence Lambillotte, 25, of Eldred, Pa., was killed in action at the Anzio beachhead in Italy February 12. He was employed at the Farmers Valley plant of Quaker State Oil Refining Corp. in Pennsylvania when he joined the Army.

L. E. Douglas, 54, independent oil operator of Sedgwick, Kans., died March 24 in a Hutchinson, Kans., hospital of burns suffered a short time before as a result of bedclothing igniting from a cigaret.

First Lt. Ralph O. Huebner, 28, employed for several years by Houston Oil Co., was killed in Italy February 21 while serving in a coast artillery antiaircraft corps. His home was in Houston and he was a senior at University of Texas when he enlisted for war service.

Walter R. McShane, 61, an accountant in the purchasing department of Stanolind Oil & Gas Co., died March 21 at his home in Tulsa.

Woodson M. Kime, 66, for 44 years an oil-well driller, died March 18 in Oilton, Okla.

William V. Walton, 83, retired attorney of Columbus, Ohio, for 35 years associated with Logan Gas Co. and Ohio Fuel Gas Co., died last week.

Henry C. Lyon, 72, former oil-field worker, died March 26 in Tulsa.

Philip E. McGowan, vice president of Western States Gasoline Corp., died March 19 at his home in Los Angeles.

W. B. Skirvin, 84, who had extensive oil interests and operated two hotels in Oklahoma City, died in that city March 25 of pneumonia which resulted from injuries suffered in an automobile accident.

J. V. McMahon, 62, independent producer, of Tulsa, died March 26 at the Tulsa Club, where he resided. He resigned last fall as general manager of Snowden & McSweeney Co.'s office in Fort Worth. He had served as president of the old Sinclair Oil & Gas Co., leaving that post about 20 years ago.

L. Ray Dawson, 51, independent geologist, operator and wildcatter of Oklahoma and Texas, died recently of a heart attack at his home in Oklahoma City.

William R. Brison, 65, of La Porte, Tex., who retired last November as assistant superintendent of Humble Oil & Refining Co.'s refinery at Baytown, Tex., died March 24. He joined Humble in 1922 as chief chemist at the Baytown plant.

B. C. Hockedorn, employed in the accounting department of Humble Oil & Refining Co., Houston, died March 12 in a Houston hospital.

Edward S. Billings, 30, Houston, boilermaker, died March 13.

Continental Uses Central Metering and Separator Batteries in North Texas

by Harry F. Simons

Important savings have been realized and other advantages attained by Continental Oil Co. by the employment of central separator batteries in various North Texas pools. A major phase of operation in these installations concerns metering of oil and gas production. Representative of these installations are those serving the Mueller and Hildreth fields in Montague County. Operation of these projects is described in this article.

RECENT construction of production facilities in pools being currently developed by Continental Oil Co. in North Texas has as its principal feature central separator batteries, metering equipment and a reduced amount of tank-storage space.

The meters play an important role in the reduction of the amount of tank-storage space required as they permit production from a number of wells to be run into a common tank. They also provide an easy and accurate source of information on the amount of oil produced daily and the total amount produced from each well or lease.

The trend toward central tank batteries has come about through a consideration of the economic features of the production operation. Not so long ago, each well had its own tank battery. This was followed by the practice of equipping each lease with a single battery and this in turn is giving way to equipping groups of leases, or an entire field, with a single battery.

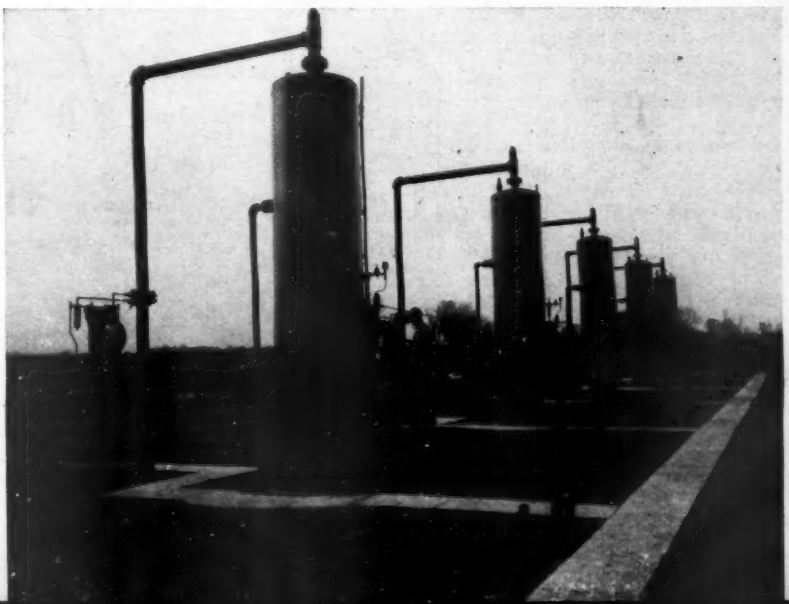
From an over-all standpoint, including pipe-line gathering, the central installation has a very definite advantage. Where individual lease or tank batteries are used, the pipe-line company must install a gathering line to each of the batteries. If a central battery is used, the problem is greatly simplified and the gathering facilities (including gathering-pump installations) sharply reduced.

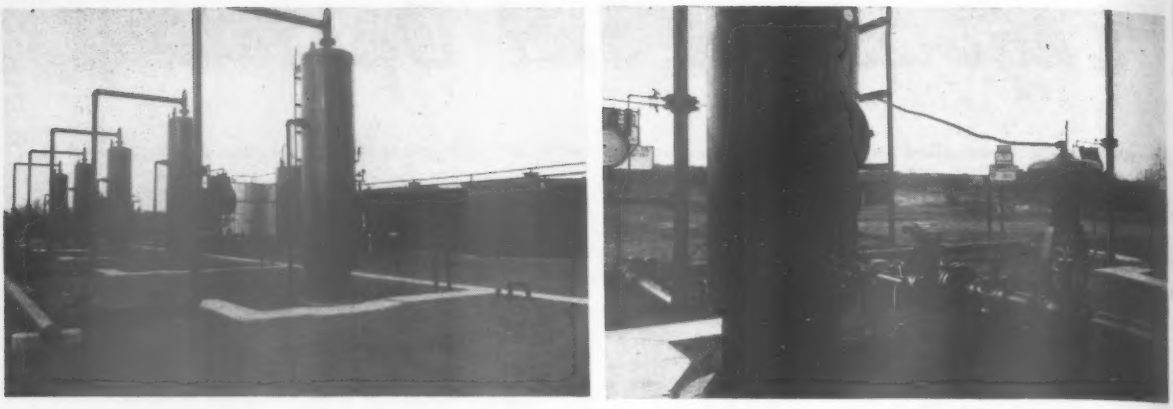
Strictly from the production angle, there is a marked economy in using the central battery as the comparatively expensive tankage is replaced by rather cheap pipe lines from the well to the battery. Naturally, there is a limit on the length of line which can be laid in order to eliminate a tank installation. This would depend on cost of laying the line which would in turn be affected by the terrain traversed. Gathering lines up to 2 miles in length, and longer, are feasible.

Role of Meters

While there are a number of central tank batteries which do not include metering facilities, important economies can be obtained with them. The ultimate objective of a number of production engineers is to produce oil from a well through a meter and directly into the pipe line, eliminating lease tankage altogether. This stage has not been realized yet but meters at present permit production from a number of wells into a common tank. They also will allow the running of oil from a tank while oil is being produced into it, although, again, this is not a practice commonly followed. Another benefit is the reduction in time between production of the oil and its delivery to the pipe line brought about by the quicker filling of a tank into which several wells are produced. Gaging to determine the amount of oil produced from a well during any particular period is, of course, eliminated. The pumper simply reads the reset count-

Oil-metering side of separators in Mueller pool, Montague County, Texas. Motor valve controls dumping of separator fluid through meter. One of the 2-in. drops goes to stock-tank header and the other goes to test-tank header





Left: Over-all view of separators, meters, and stock tanks on Continental Oil Co. property in the Mueller pool, Montague County, Texas. One-inch line just below the gas-meter drop equalizes the pressure on the gas-venting system. Right: Closeup of motor valve and oil meter on separator on one of Continental Oil Co.'s North Texas properties. Upper counter on meter can be reset while lower one is totalizer. Rate of flow is registered in tenths of gallons on vertical dial

er on the meter. The continuous counter affords a check against the total of the tabulated daily production from each well.

In addition to the oil meters, the gas produced from each well is also metered as it leaves the separator. Water produced can also be metered after it is separated. This permits accurate statistics to be obtained on the total volume withdrawn from the reservoir. Such data are very valuable in pressure-maintenance and repressuring operations. It is also possible to meter the power oil used in hydraulic pumping so that the efficiency of the operation can be checked.

The central separator and metering arrangement can be, and is, combined with the means for producing the wells. On flowing wells, the pumper opens the well and then can check its operation at the separator. Certain types of production arrangements, such as hydraulic pumping, electrical-centrifugal pumping, gas-lift, and time-control beam pumping, can all be centralized at the tank battery and the pumper can check the entire operation from that point. Only occasional inspection trips to the individual wells are then necessary. Potential reductions in field personnel are important.

Mueller Pool Operations

Continental Oil Co.'s installation in the Mueller pool in Montague County represents the intermediate type of central separator and storage installation as it originally was a standard operation. The meters were installed approximately 2½ years after the field's discovery. Principal difference is in the number of stock tanks, sufficient storage being available at the Mueller installation for producing four wells by allowing two 250-bbl. tanks to each well. At present there are two wells producing from the Simpson formation and three producing from the Caddo. At the Hildreth pool, also in Montague County, three 1,000-bbl. tanks are used to handle the production from eight wells. Aside from the difference in tankage, the equipment is essentially the same.

Facilities at Mueller include five separators, eight 250-bbl. bolted stock tanks, one 210-bbl. gun-barrel tank, a 750-bbl. power oil tank, a 50-bbl. check tank, seven oil meters and five gas meters. One of the extra oil meters is on the gun-barrel outlet and the other is on the hydraulic-pumping power-input line.

The five separators are installed in a line and are about 15 ft. apart. This distance will permit the separator facilities to be doubled conveniently by placing an additional separator between each pair now in use.

The separators are 30 in. in diameter by 10 ft. high with a working pressure of 125 lb. per sq. in. and maximum pressure capacity of 250 lb. per sq. in. Each separator is capable of handling 6,000 bbl. of oil per day and 6,000,000 cu. ft. of gas. Separators are operated at 20 lb. per sq. in. pressure.

Separator Hookup

Flow lines from the individual wells enter their respective separators. The gas vent from the separator is a 4-in. line dropping to the ground where it is manifolded into a 6-in. line to the vent riser. Orifice meters, which operate at 20 lb. static and 50 lb. differential pressures, are located on the drops and are supported by an arm attached to the riser. The vent line from each separator is equipped with a valve. There is also a thermometer well for determining the gas temperature.

An equalizing line is installed on the vent lines between the drops and the vent valves. This maintains an even pressure on the separators at all times. It is from this line that fuel to run the engines, etc., is obtained.

Fluid discharge line from each separator is equipped with a motor-oper-

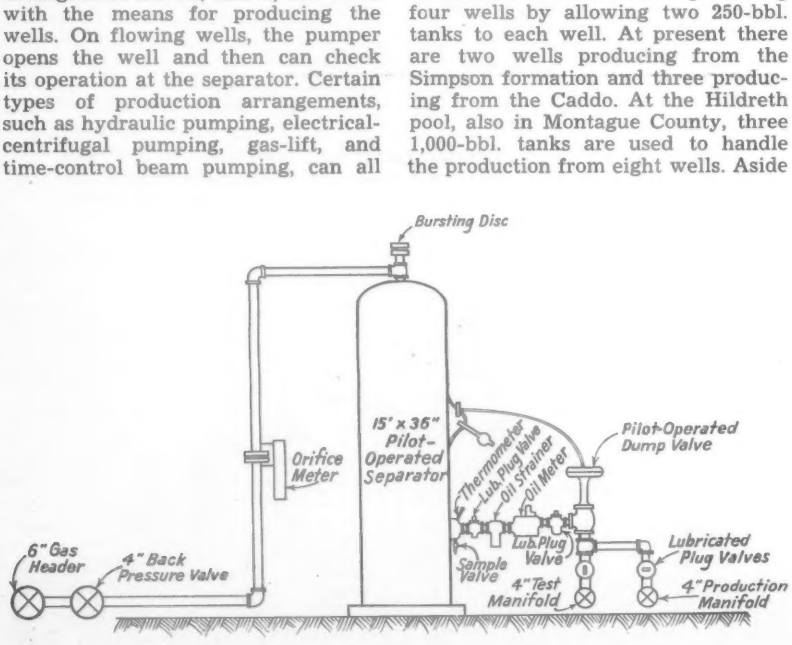


Fig 1: Schematic diagram of metering hookup and separator used by Continental Oil Co. on some of its properties in North Texas

ated dump valve, a 4-in. by 2-in. swedge, 2-in. stopcock, strainer, meter, 2-in. by 1-in. swedge, motor valve, 1-in. by 2-in. swedge, 2-in. tee and drop and 2-in. L and drop. The drop from the tee runs to the 4-in. header to the 50-bbl. check tank and that from the L runs to the 4-in. header to the storage tanks. There are sampling connections and thermometer wells in the 4-in. by 2-in. swedge. Meters can thus be corrected for temperature variations. Samples for grindouts are obtained several times daily.

Meters on the oil-discharge line from the separators have a maximum capacity of 100 bbl. per hour and will operate at a maximum pressure of 120 lb. per sq. in. The totalizing counter registers in 42-gal. barrels as does the reset counter. There is also a flow indicator which registers in 0.1 gal.

Checking of Meters

The oil produced as shown by the meters is checked against tank gagings and the meter is periodically checked by flowing into the 50-bbl. tank. Run tickets are based on meter readings. If any discrepancy appears between the meters and the tank gages, they are checked immediately. It has been found that the operation can be carried on with an error in total oil production approaching 0.5 per cent. Oil produced into the check tank is evacuated by a small centrifugal pump driven by an internal-combustion engine.

A pressure is maintained on all tanks in the battery to reduce the losses through evaporation and to maintain the gravity of the oil as high as possible. Overflows between the tanks pass underneath the walkway.

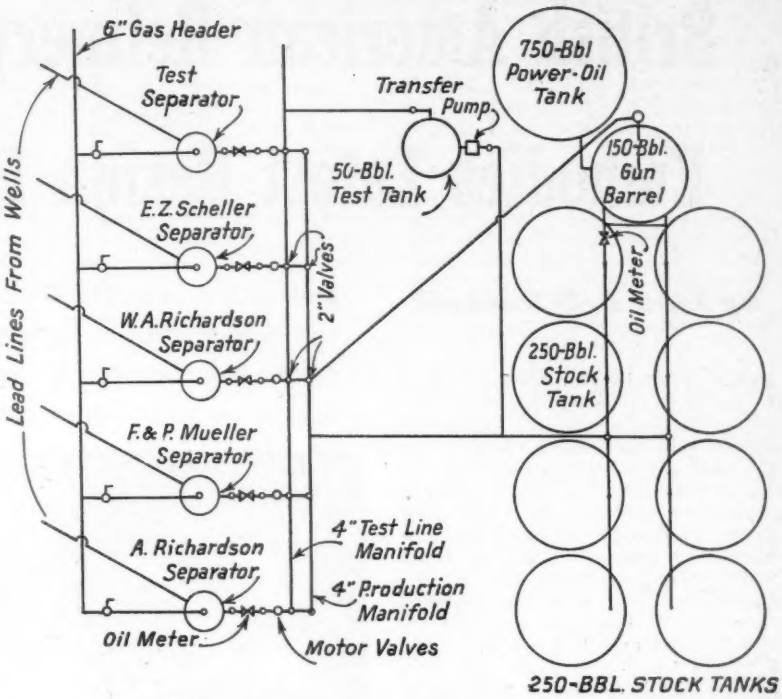


Fig. 3: Separator, meter and tank hookup in Mueller pool. One well makes some water and is lifted with a hydraulic pump so tank battery must include a gun barrel and a power-oil tank. Clean oil coming from gun barrel is metered so water produced can be computed by simply subtracting its figures from those on the separator meter

Produced oil free from water is run directly to storage from the separators while that containing water is run to the gun barrel. Only one of the five wells producing through the central separator installation at Mueller makes water, and it is lifted by a hydraulic pump. Therefore, not only must the water be separated from this oil but the power oil must also be segregated out.

Segregation of Water

Separation of the water from the oil is effected in a gun-barrel tank with the usual grasshopper and siphon breaker. The gun barrel is equipped with two outlets, one slightly above the other. The lower one goes to the power oil tank and thus maintains it full at all times; the upper one goes to the stock tank and oil passing through it represents net produced oil from that particular well. The line to the stock tank is equipped with a meter and consequently the net produced oil can be determined directly and the produced water indirectly.

Produced water is not presently metered although it may later be desirable to do so. As only one well is being artificially lifted the metering of the power oil serves only as a check on lifting efficiency. Later, meters on the power oil lines to the various wells will afford valuable operating data.

At present there are five wells on as many leases in the Mueller pool being served by the single central installation. Total production is approximately 525 bbl. per day of 42° gravity oil. Two of the wells produce

(Continued on page 105)

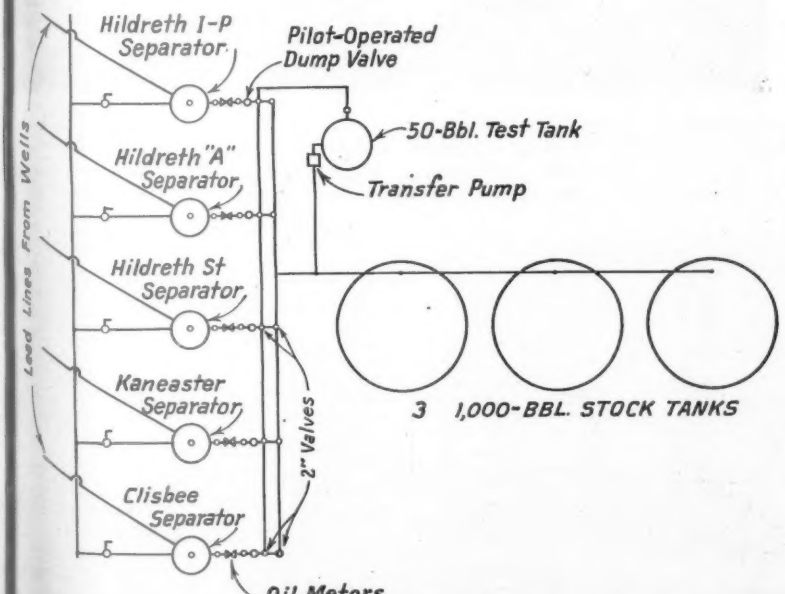


Fig. 2: Diagram of oil-metering, separator and tank-battery hookup of Continental Oil Co. in the Hildreth pool. Three 1,000-bbl. stock tanks are used to handle the production from 10 wells. Diagram shows only half of the separator battery

British American Refinery at Clarkson Embodies Latest Design Developments

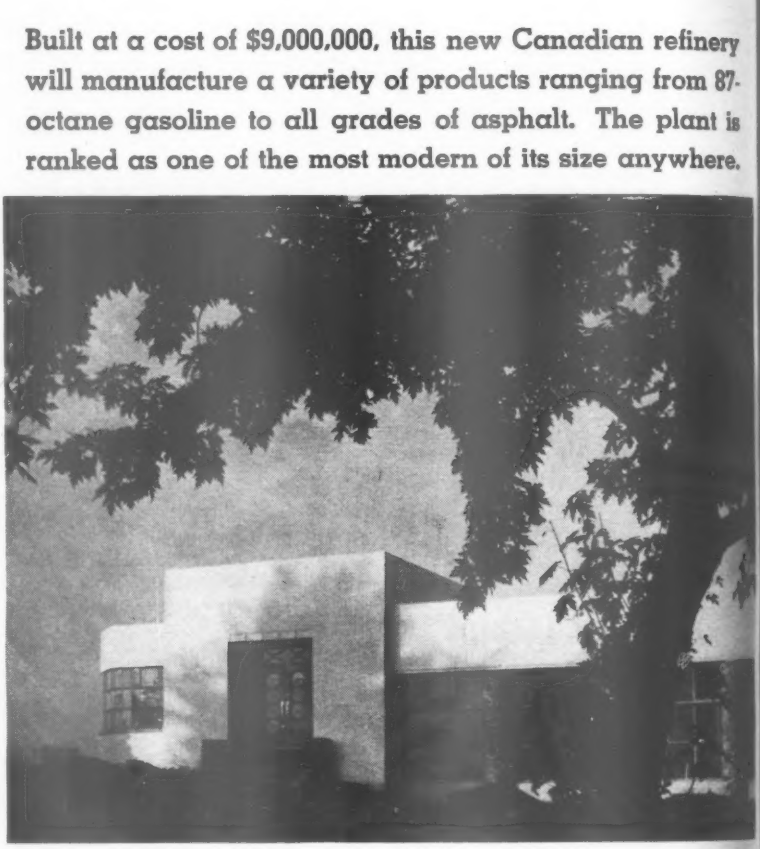
by John P. O'Donnell

Built at a cost of $9,000,000, this new Canadian refinery will manufacture a variety of products ranging from 87-octane gasoline to all grades of asphalt. The plant is ranked as one of the most modern of its size anywhere.

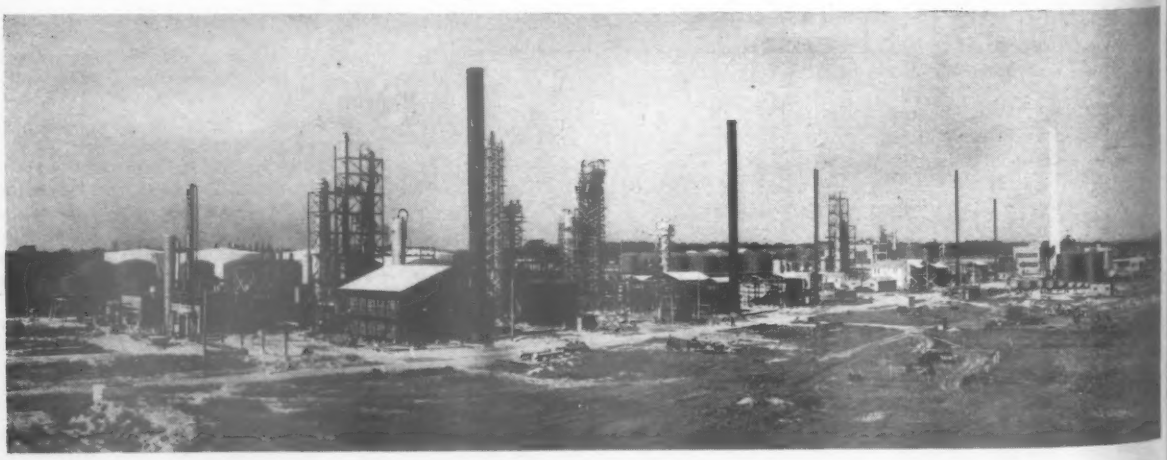
PRODUCTS ranging from 87-octane gasoline through high viscosity-index lubricating oils to all grades of asphalt will be manufactured in the new refinery of British American Oil Co. at Clarkson, Ont. The refinery is completely new and the units comprising it embody the latest developments in design, including many which were introduced here for the first time. They rank the Clarkson refinery with the most modern of its size in existence. The quality of the products which the plant will produce, critically needed in a period of war, justified its construction at this time. It involved an expenditure of $9,000,000, all of which was borne by British American.

Principal units in the Clarkson refinery are the crude-oil atmospheric and two-stage vacuum-distillation unit, a polyform unit, acid treater and rerun unit for production of high-octane motor or aviation gasoline and the lubricating-oil plant consisting of a Furfural refining unit and a solvent dewaxing unit and a contact filtration plant. These units are supplemented by a modern boilerhouse, laboratory, office building, shops, tankage, dock, etc.

Because it is entirely new, construc-



Panoramic view, below, of British American Co. refinery at Clarkson, Ont. Units, left to right, are: polyform, atmospheric and two-stage crude distillation, gasoline rerun, furfural solvent extraction, solvent distillation, boiler house, and acid-treating unit. Frame structures used as construction offices were to be removed later. Note ample space in foreground for expansion. The other view on the page is of the office building at the refinery, which is indicative of the up-to-date character of the architecture



tion of the refinery did not require that consideration be given to any existing equipment. Therefore it was possible to lay it out on an ideal basis employing only the most modern processes so arranged as to function with maximum efficiency. The atmospheric and vacuum - distillation units and the polyform unit are widely spaced on one side of a road, the other side of which is open for future expansion. Allowances were made in building the lubricating-oil plant to provide adequately for future extensions. The entire refinery area embraces 300 acres, of which only a small part is devoted to process equipment. Other equipment is laid out for maximum convenience and efficient operation.

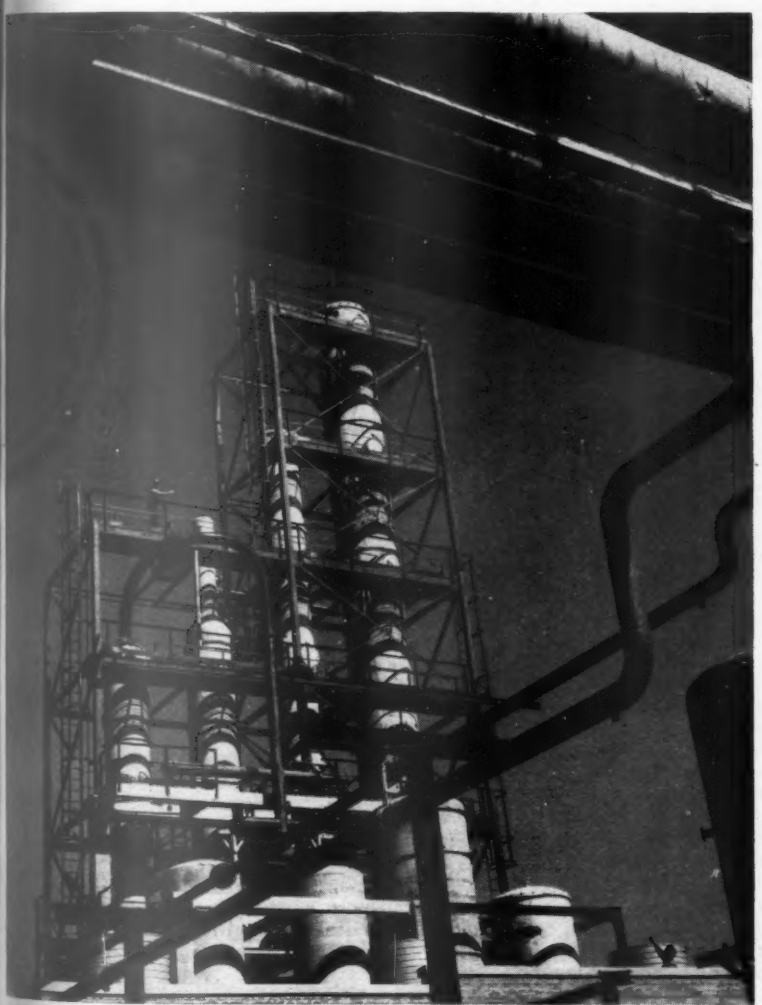
The site is on the Ontario lake front, about 20 miles southwest of Toronto where the company's head offices and the oldest of its six refineries are located. The location was selected after a thorough investigation of its value with respect to transportation facilities, utilities and as a construction site. Its proximity to the most populous areas of Canada which can be served by lake tanker, transcontinental rail lines or tank truck makes it desirable from a transportation standpoint. A spur from the Canadian National Railroad serves the refinery's 20-car loading rack while a concrete dock, extending 1,900 ft. into Lake Ontario and capable of berthing four 24 - ft. - draft tankers simultaneously, provides water - borne transportation facilities.

Located on Ideal Site

The location is ideal as a construction site. The whole area consists of 8 to 10 ft. of clay top soil underlain by shale capable of supporting the heaviest refinery structures. While the site slopes gently toward the lake, no watershed drains on to it so that drainage is a simple matter and the site remains unusually dry. The soil is ideal for tank-dike construction.

Electric power is purchased from the Ontario Hydroelectric Commission. It is received at the refinery's main substation at 26,000 volts and reduced to 2,300 volts for distribution through the plant. The 2,300-volt system is entirely underground. It delivers the power to seven substations within the refinery where it is stepped down to the 550 and 110-volt terminal systems that are used. Each of the plant stations is equipped with a circuit breaker so that in case of emergency involving one, units served by others would not be affected. The boiler plant, equipped with three boilers which may be fired with either oil or gas, was designed to produce 180,000 lb. of steam per hour.

Water for the refinery is obtained from the lake. Because of lake currents, sand and other sediment are washed continuously away from the shore so that the water is unusually clean. Tests have shown that it contains only 100 p.p.m. of solids. The temperature ranges from 38° F. in winter to 68° F. in summer, which makes it ideal for cooling purposes. In winter hot water from the API waste water separator is mixed with makeup from the lake, raising the temperature of the cooling water to 50° F. at which it is uniformly maintained. The water is obtained through a 42-in. intake line paralleling the dock and extending 1,200 ft. into the lake. The intake end is 20 ft. below the surface of the lake. This line empties into the pump house forebay and provides a positive suction head for the water pumps. The pump house is equipped with three motor-driven pumps, and two standby steam pumps, with a total capacity of 22,000 g.p.m. Through a valve-manifold system the cooling water pumps can be used for fire pumps during an emergency.

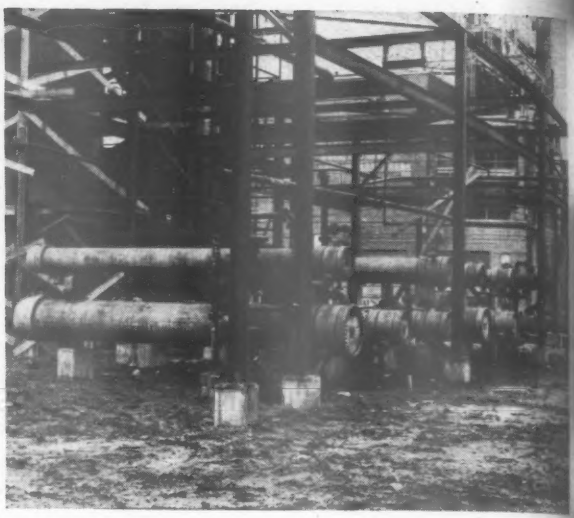


Towers on furfural solvent extraction unit in which vacuum fractionated distillates are processed for removal of olefins, aromatics and naphthenes

Crude-Charging Capacity

The crude-charging capacity of the refinery will be approximately 10,000 bbl. per day. At present the charge consists entirely of 36°-37° A.P.I. gravity Illinois crude which probably will be supplemented later by some Oklahoma City crude. The plant is designed and can be operated at any time on request of the Oil Controller for Canada for the maximum production of needed 87-octane gasoline. The crude is topped in the atmospheric distillation unit to approximately a 35 per cent 19° A.P.I. bottom which in turn is charged to the vacuum distillation equipment where gas oils, raw lubricating oil distillates and asphalts are produced. Gas oils and naphthas are charged to the polyform unit.

The design yields of the plant are given below, both when running for maximum aviation - gasoline production and for motor-gasoline production:



Left: Steam and electric water pumps for which positive suction head is provided by their setting, 20 ft. below ground. Right: Battery of heat exchangers on futural unit at the refinery

Product (yield %):	Type of operation—Aviation gasoline	Motor gasoline*
Gasoline	43.0	53.2
White products	..	4.5
Furnace oil		6.4
Bunker C	26.4	11.1
Lube oils	11.9	11.9
Asphalt	7.5	7.5
Gas, losses	11.2	6.4

*70.5 octane.

The crude-distillation section consists of an atmospheric tower and primary and secondary vacuum towers. A total of 14 cuts may be taken from these towers, illustrating the flexibility of the plant. The atmospheric tower, operating with a temperature range of 675° F. at the crude inlet section to 160° F. (top), is equipped to produce an overhead stream of straightrun gasoline and side streams of naphtha, V.M.&P., Stoddard solvent, kerosene and light gas oil.

Polyform Unit

The polyform unit is one of the few such multicoil units charging both naphthas and heavy gas oil. It was designed to make 87-octane gasoline with 4 cc. of lead. When operating for the maximum yield of gasoline, the polyform unit charges, principally, the naphthas from the atmospheric tower and the heavy gas oil from the secondary vacuum tower. This charge is run to a gas absorber where C_5 and higher fractions lost in the straightrun and polyform stabilizers are picked up. The overhead from the stabilizer is charged to the heavy-oil section of the two-coil furnace while rich oil is charged to the light-oil section.

These furnace outlet streams are quenched and enter the evaporator. The overhead from the evaporator passes to the bubble tower and the bottoms to a flash tower. An overhead stream from the flash tower, from which the fuel oil has been separated, also passes to the bubble tower. The bubble tower overhead is stabilized as finished polyform gasoline. Furnace oil is also produced in this tower as a side-stream product.

When producing 400 end-point motor gasoline, the yield is expected to average 53.2 per cent of the over-all crude charge. The cracked gasoline will have an octane number of 74.3 (all octane numbers are A.S.T.M. Motor method) while the octane number of the over-all gasoline (clear) will be 70.5. The octane number of the over-all gasoline with 3 cc. TEL will be 82.7, indicating the high lead susceptibility of the polyform product.

When operating to produce a maximum of aviation gasoline, the charge to the polyform unit will vary considerably from motor-gasoline operation. In the operation for aviation gasoline the straightrun stabilizer is operated so that the Reid vapor pressure of the gasoline is low, in the order of 4 lb. instead of 7 lb., to eliminate the low-octane normal pentanes. In order to offset this effect, the polyform stabilizer is operated so that the vapor pressure of the gasoline is approximately 8 lb. to include the bulk of the C_5 fraction which, at this stage, is principally isopentane which has an octane number of 91. This polyform gasoline is acid treated to improve stability and lead susceptibility.

In another step to improve the octane value of the gasoline, the charge to the heavy-oil coil is lightened and the end point of the product reduced. Instead of a normal charge of 70 per cent gas oil and 30 per cent naphtha, as in motor-gasoline production, the total fresh feed consists of approximately equal proportions of gas oil and naphtha. The bubble tower is operated to produce 380-end-point material which is acid treated and rerun. In rerunning, the end point is reduced to 300 and the material in the 300-380-end-point range is returned to the light-oil coil for further polyforming. Since this material is refractory it contributes to the high-octane quality of the finished gasoline as well as to the yield.

Four Cuts Taken

Bottoms from the atmospheric tower are charged to the primary vacuum tower which operates under a vacuum of 40 mm. mercury absolute. The charge is preheated in a furnace and enters the tower at 750° F. Four cuts are taken off the primary tower: bulk distillate as an overhead, distillate "C" which finishes as aviation 80 oil, distillate "D" which finishes as base material for heavy aviation lube oil or steam cylinder stocks, and asphalt as bottoms. An additional side cut can be obtained if necessary to control the penetration of the asphalt bottoms. Distillates "C" and "D" are run through separate side stream strippers to get high flash characteristics. The bottoms from the primary vacuum tower are 60 penetration asphalt. This will constitute the major portion of charge to facilities now being added at Clarkson for the production of industrial or paving grades of asphalts.

The bulk distillate is charged through another furnace to the secondary vacuum tower, operating under a vacuum of 100 mm. mercury absolute, which it enters at 650° F. The overhead from this tower consists of heavy gas oil which is used as part of the polyform charge. A side stream, distillate "A" which finishes as S.A.E. 10 and the bottoms, distillate "B" which finishes as S.A.E. 30 oil, are also produced. Distillate "A" also passes through a separate side-stream

ENGINES

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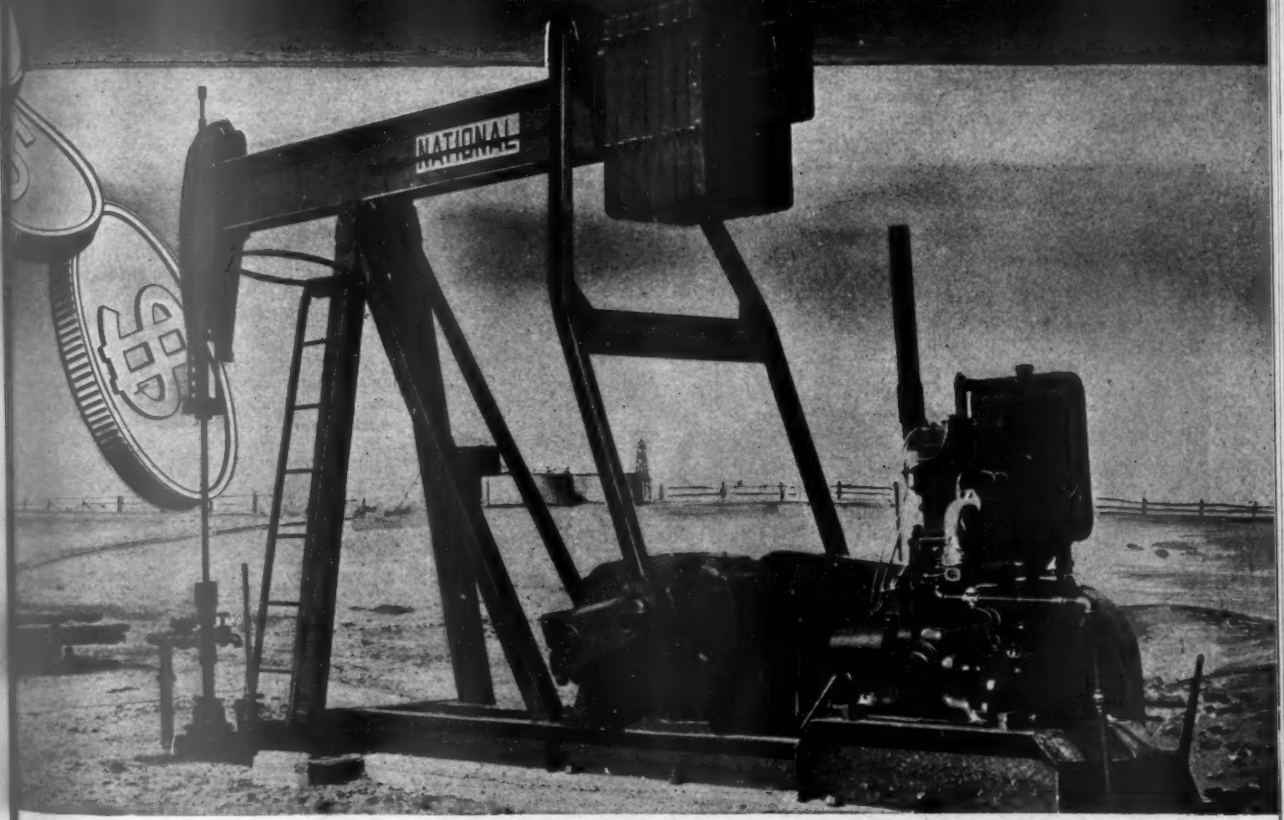

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se complete, self-contained units are suitable for outdoor service ywhere, when mounted on either steel pumper frame or on concrete. ily understood and operated by unskilled labor.

TYPE	DVA	EA	FB
Bore and Stroke	4 x 5	5 x 6	6 x 7
Piston Displacement per Stroke	125.7	235.6	395.8
Rated BHP	10	20	30
Rated RPM	400-800	350-700	400-650
Approximate Length	40¾"	47⅛"	65½"
Approximate Width	26⅛"	30"	35½"
Approximate Height	49⅝"	53"	68"

ve horsepower for continuous service. Ample power in reserve for sudden emergency or overload.

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stripper for high flash characteristics. By separating the grades in this manner, it is possible to produce competitive flash motor oils without any secondary fractionation.

The lubricating-oil distillates from the vacuum towers are then run to storage for individual processing later in the Furfural refining, solvent dewaxing and contact filtration plants. This series of processes enables British American to produce the finest grades of lubricating oil since it is not only complete but embraces several innovations introduced to further improve product quality.

Treating Tower

The distillate charged to the Furfural refining unit is heated before entering the treating tower. This treating tower is unique in several respects. It differs from previous Furfural towers in that two intercooling sections are provided to attain more exact temperature control. The two takeof lines for circulating portions of the tower are located just above the interface level. After passing through water coolers the material is returned to the tower over dispersion decks. Better separation of raffinate and extract is expected as well as increased yield possibilities.

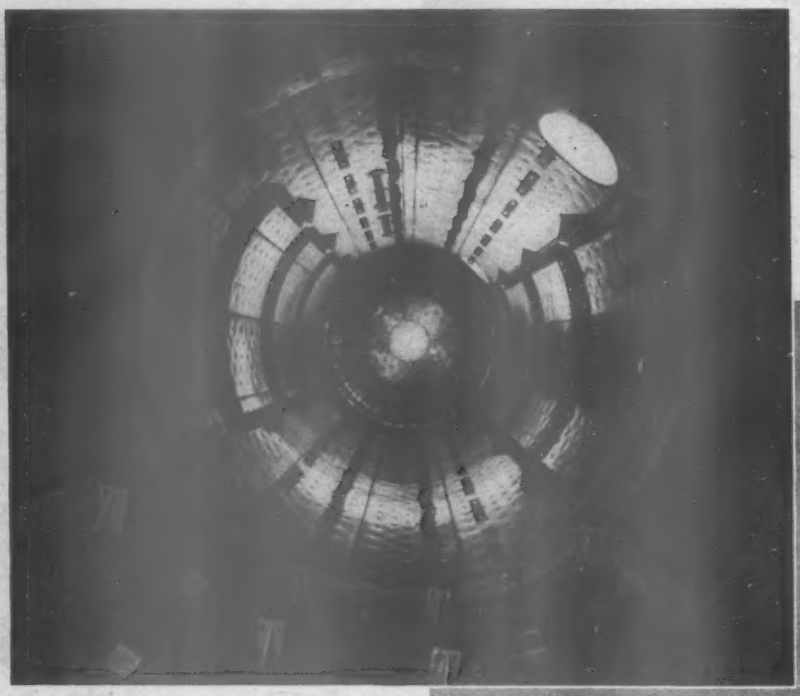
The tower, packed with Raschig rings, is unusually high, rising 106 ft. above grade with a 100-ft. contact section. The height provides for large contact surface, ample for proper countercurrent extraction. Both the raffinate and extract pass from the tower to solvent recovery units and the raffinate moving on to the solvent dewaxing unit. Stripping heat is provided by furnaces fired by National Airoil oil or gas burners.

In the solvent dewaxing unit the Furfural refined oil is mixed with the solvent dewaxing agent, a blend of methyl ethyl ketone and benzol plus toluene, in a ratio depending upon the charging stock, before being charged to the ammonia chillers. Two large Worthington steam compressors are required to handle the ammonia in the chilling section. The ammonia temperatures are lower than normally found in dewaxing plants so as to produce very low-pour-test oils that are needed in Canada. This unit is capable of making a minus 35° F. pour-point oil.

Another unusual feature of the dewaxing plant is the setting of the Goslin-Birmingham vacuum filters. In the British American plant they are set so as to allow maximum access for operation and maintenance without necessitating substantial increases in building height. The filters also include the comparatively new inner pure system in the blow-gas assembly.

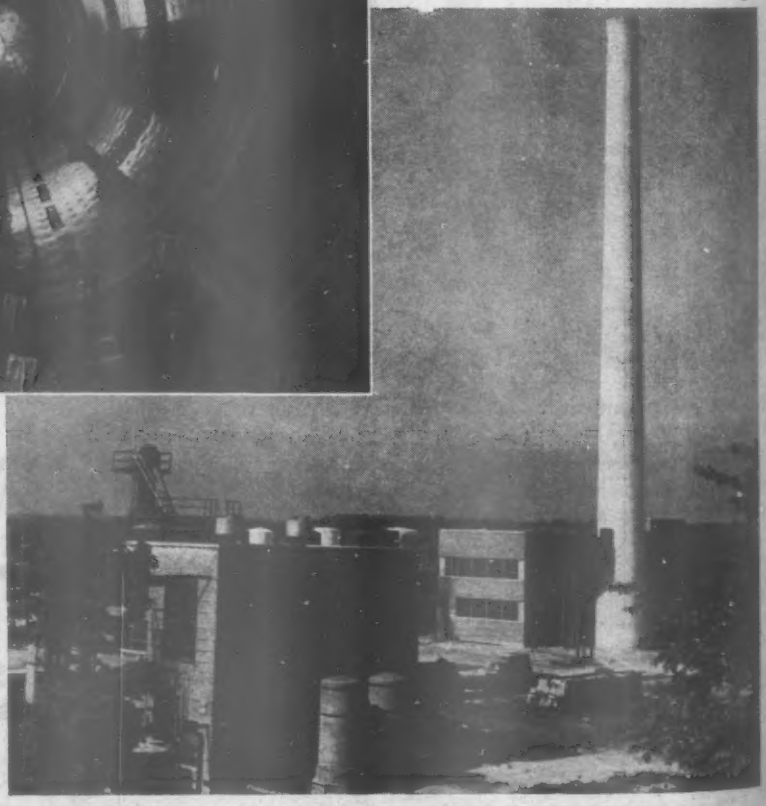
Finishing Lubricating Oils

Lubricating oils, S.A.E., 10, 30 and 50 grades, are finished directly in the contact-filtration plant. This plant is designed to improve the demulsibility quality of the oils and to increase their oxidation resistance and color stability. In the contact unit the oil and clay are mixed to form a slurry which is heated to attain the maximum clay efficiency. The volume of clay added to the oil is controlled by a new-type measuring device which weighs the clay en route to the tank. Separation of the oil from the clay is effected in an Oliver precoat filter. Heavy aviation oils and heavy lubricating oils may undergo sulfuric acid treatment, depending on their end use, before going to the contact filtration plant. As added insurance to obtain a completely solids-free product the contacted oil is final-



Above: Monel lining in the upper 21 ft. of one of the fractionating towers

Below: Acid-treating plant in the foreground and power plant in right background. The stack towers 268 ft.



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DEHYDRATING **DESALTING**

One-Man Valves for the Little-Inch Pipe Line

by C. R. Martin*

JUST as important as the satisfactory construction of 100 gate valves for War Emergency Pipelines 20-in. products line, perhaps, was the manufacturer's conclusion, reached in building them, that valves with similar requirements for the petroleum industry call for special design and construction. Construction of the little-inch valves was based on a similar procedure which Allis-Chalmers has applied for many years to the manufacture of valves for high-pressure service in hydraulic-turbine installations.

*Hydraulic department, Allis-Chalmers Manufacturing Co.

Probably the best proof that the gate valves constructed met and exceeded the requirements is the fact that they are "one-man valves." That is, as large as these valves are, one man can readily turn the wheel to operate them, and this is well within the imposed limitation of "150 lb. operating force applied to the hand wheel."

Specifications called for valves with a diameter of 20 in., to operate under a pressure of 800 lb. per sq. in. and capable of withstanding a test pressure of 1,600 lb. per sq. in. They are of the parallel seat type with self-aligning double disks, each disk free

Fig. 2: Assembled view of disks, steam and thrust nut for 20-in. diameter hand-operated gate valves for 800-lb.-per-sq.-in. water, oil, or gas service

Fig. 1: View of assembled 20-in. hand-operated parallel-seat gate valve with double self-aligning disks and wedge tighteners for 800-lb.-per-sq.-in. water, oil, or gas service

to rotate on its support. High strength of materials as well as highly accurate machining were essential in the manufacture of these valves for emergency service. In building them, the assistance of WEP engineers was an important factor.

Among all of the design considerations, even appearance was not neglected, and all parts are carefully blended into a selfcontained unit (Fig 1). The connection between the bonnet and the yoke is rounded to give greater structural unity. The counterbore of the yoke matches the counterbore of the bonnet to provide perfect alignment of the stem, an important detail in reducing the power required for operation. The valve stem is completely enclosed in a lightweight cover which telescopes inside the gear housing for convenience in repacking the stuffing box. Placed on top of the valve, the indicator is enclosed in a cylindrical tube made as part of the spun cover.

To make certain that the force needed to operate the valves would not exceed the 150-lb. maximum specified, all materials that involved moving parts were laboratory tested, and frictional coefficients for various bearing pressures were determined. Actually, it was possible to design

Fig. 3: Checking double-disk assemblies for correctness of machining and amount of wedging action before assembly in valve body

the moving valve parts to respond to an operating force of as little as 30 lb.

All design stresses in the cast-iron body, bonnet, and disks were limited to approximately 6,000 lb. per sq. in. under a test pressure of 1,600 lb. per sq. in. This large safety factor was allowed in order to avoid plastic deformation and stress build-up because of repeated application and relief of pressure.

In the assembly of the moving valve parts, (Fig. 2) a stem of heat-treated stainless steel is screwed into a cast-iron spreader, which cooperates with a wedge to tighten the disks when in closed position. Projections on the spreader fit into cylindrical bores in the disks, which are hung on either side. The disks are mounted on spherical segments allowing them to pivet in any direction about a central point on the spreader thus making them selfaligning.

To close the opening through the valve body, the double disks are lowered from the bonnet portion of the valve to contact position with the seat rings in the body. In sliding over the seats, the disks are operating against a pressure of approximately 450,000 lb., which is transmitted to the seat rings in the body through facing rings threaded to the disk surfaces.

The opening and closing of the disks is actually accomplished as the valve stem is raised or lowered in cooperation with a movable bronze thrust nut. The thrust nut is in turn rotated by a high-test iron bevel gear and steel pinion through the force exerted on the handwheel.

Total ratio between force supplied on the handwheel and force exerted by the stem was determined as 500 to 1. Holding to the maximum force allowable for manual operation of the handwheel, it was necessary to obtain a coefficient of friction of about 0.167 between the seal rings. Careful selection of materials, alignment of stem, and accurate machining of the thread on stem and cooperative nut were absolutely essential for this result.

Contributing to the efficiency of the stem and permitting minimum stem diameter was the heat treatment of the stainless steel to 250 Brinell hardness. The Acme threads used on stem and thrust nut are made with lead screws of precision measurements.

An important design feature of the gate valves is the wedge which makes possible a further tightening of the moving valve parts after the disks have reached closed position. Wedging action is obtained by forcing an aluminum bronze wedge against an inclined surface machined on the spreader. The lower projection between the two valve disks, shown in Fig. 2, is a portion of the wedge. When the disks reach the closed position, this part of the wedge strikes a button cast in the valve body. Clearance is provided between the spreader and the disks so that the spreader can be forced down over the wedge without further movement of the disks to make the disks tight against the seats in the valve body.

Fig. 3 is a view of the component parts of the double-disk assembly. These assemblies were checked for over-all dimensions to make sure that the location of the wedges was correct for efficient wedging action, and also to allow for wedging after wear takes place.

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The seats in the valve body are of Ampco No. 22 bronze with an average Brinell hardness of 340, and the facing rings on the valve disks are of Allis-Chalmers aluminum bronze, with 200 Brinell hardness. Both castings (shown in Fig. 4) were made in a spinning mold.

Under 800 lb. pipe-line pressure, the bearing pressure on the seats is approximately 2,600 lb. per sq. in. If there were high spots on the valve seal rings under this pressure, the permissible coefficients of friction (about two-tenths) would very likely be exceeded. To avoid this, and also to keep leakage area to the millionth of a square inch, theoretically allowable, the surfaces of the facing rings on the disks and the seat rings in the valve body are machined with a precision grinder to as smooth a finish as possible. In a test under 800 lb. pressure, leakage through sets of seal rings was only about 1 tablespoonful of water in a 15-minute period.

Each of the gate valves has been provided with a quick-opening relief valve located in the top portion of the bonnet and set for opening at 1,100 lb. pressure. Previous pipe-line experience has shown that for every degree rise in temperature in the bonnet of a valve of this size, and with the valve in closed position, the pressure in the bonnet increases about 70 lb. Since the valves are buried in the ground except for the top portion of the bonnet they are to a great extent protected from temperature rise. It is expected, however, that with the valve closed and with cold liquid trapped in the bonnet, a rise in outside temperature will result in some degree of pressure increase within the bonnet. In this emergency, the relief valve will prevent breakage of either valve body or valve disks.

Four gate valves have been installed at each station on the 20-in. pipe line, and two will operate at each of the main river crossings.

Fig. 4: Seal ring for double disks and body for 20-in. hand-operated gate valves

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Building housing the Unisol-unit towers extending through roof, at Big West Oil Co., Kevin, Mont.

Soda-Methanol Reagent Removes Mercaptans Quantitatively at Big West Oil Co.

by F. C. Moriarty*

FOR more than 18 months a Unisol† treating unit has been operating in the refinery of Big West Oil Co., at Kevin, Mont., and is accomplishing important results. The process† removes mercaptans by extraction with a concentrated solution of caustic soda containing methanol. It is used to treat the gasoline produced by the Dubbs cracking unit in the refinery.

Before the process was installed the gasoline had been treated by doctor sweetening, which was an expensive operation. It reduced the octane number from 1 to 2 points and caused a rather large loss of gasoline. The process was adopted to cut down these losses as well as to eliminate mercaptans, and by so doing improve the tetraethyl lead susceptibility of the gasoline.

The operation of the unit has more than justified all expectations. The mercaptan content of the gasoline is being reduced from 0.06-0.11 per cent to an average of 0.0007 per cent as it leaves the treating unit, and it usually becomes doctor sweet, or nearly so, after standing a few days in storage.

> Use of caustic soda and methanol reduces mercaptans from 0.06-0.11 per cent to less than 0.001 per cent, reduces tetraethyl by about half, and decreases treating loss by one-third.

As soon as the operation was well under way, Big West shut down the doctor sweetening unit. In contrast to the loss of 1 to 2 octane numbers caused by doctor sweetening, the Unisol treating has increased the unleaded octane number by one-half point. The reduction in mercaptan content is accompanied by a corresponding reduction in total sulfur and a substantial increase in tetraethyl lead susceptibility. Prior to the operation of the unit, ethyl-grade gasoline (then 80 octane number) could not be produced in the Big West plant. After treating, the addition of 3 cc. of tetraethyl lead per gallon to the cracked gasoline makes an 80 plus octane product.

Of greater importance to Big West is the fact that the increase in tetraethyl lead susceptibility makes it possible to blend all the straight-run gasoline with the cracked product and produce house-brand gasoline. When operating the doctor sweetening unit, it was necessary to add 1.1 cc. of tetraethyl lead to the cracked gasoline to reach 74 octane number. If any substantial quantity of straight-run was blended with the cracked gasoline it could not be brought to 74

*Universal Oil Products Co.
†Licensed by Universal Oil Products Co.

tane. By contrast, a typical sample of Unisol-treated cracked gasoline, when blended with 10 per cent straightrun and 0.65 cc. of tetraethyl lead, made 75 octane number.

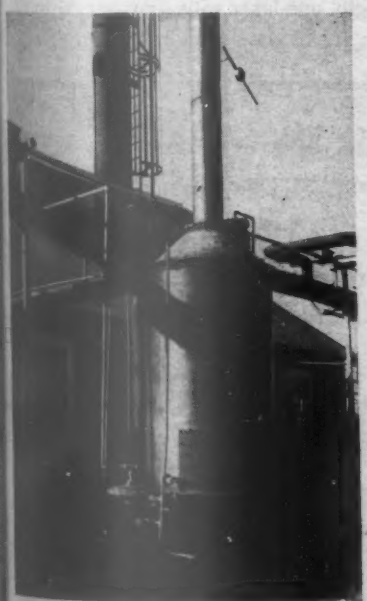
The over-all cracking and treating loss of gasoline for a 9 months' period before the unit went into operation had been 9 per cent. The loss over 9 months following the installation of treating was 5.9 per cent, or a reduction of 3.1 per cent.

Some of this reduction in loss may have resulted from minor changes in the cracking unit but it is believed that at least 50 per cent of the reduction can be credited to ths operation.

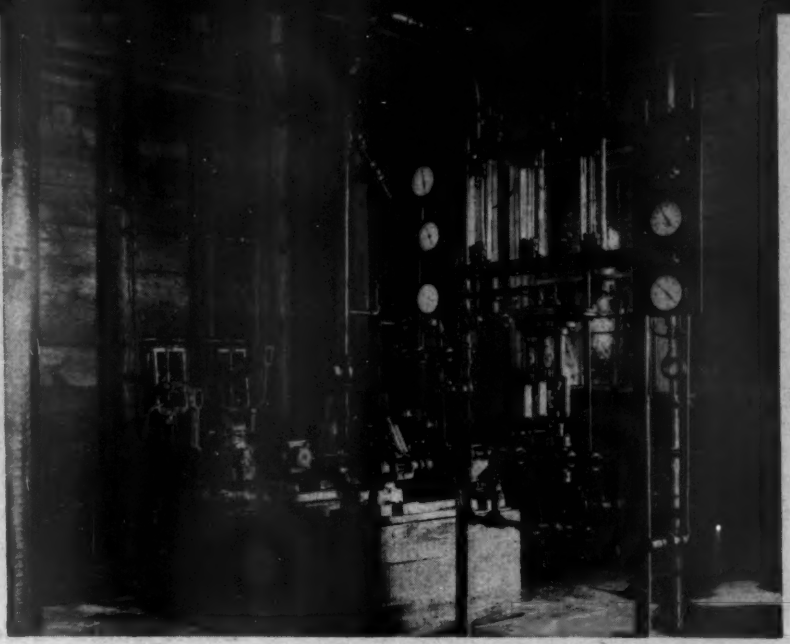
The original loss was high because of deficiencies in the doctor sweetening operation. Such deficiencies are common to many doctor sweetening units and are aggravated when a gasoline high in mercaptan content is processed.

Analysis of the mercaptans separated from the gasoline shows only a trace of dissolved hydrocarbons. This proves that the loss in treating is insignificant, inasmuch as any gasoline loss would appear in the mercaptan oil.

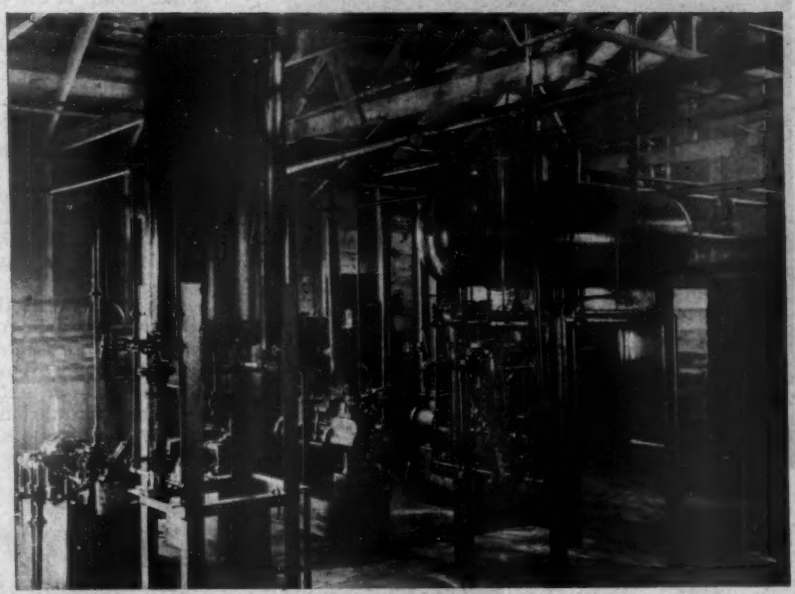
The Big West unit processes approximately 550 bbl. of gasoline a day. It is to be expected that losses of reagent in a plant of that capacity would be greater proportionately than in a larger unit, as the smaller unit has the same number of packing glands, sample valves, etc., as the larger one. Nevertheless, the Big West unit consumes less than 2 gal. per day of methanol, and the total cost of reagents is well below ½ cent per barrel treated. Labor costs, too, are low, as only part of the time of one operator per shift is necessary.



Steam superheater



Circulating pump and rotameters



Methanol column receiver and mercaptan separator

There have been no process difficulties. However, corrosion in the bottom of the caustic recovery section, which is made of carbon steel, is so severe that it was necessary to replace a 24-in. by 10 ft. section after 8 months' service, and it has been necessary to repair it several times in addition. This section is flanged to make replacements easy, and thus has not been a serious handicap to operation of the unit, which to date has made a number of runs well over 100 days in duration. Nickel-clad steel will completely eliminate the corrosion problem as soon as it is again available.

Although the Big West unit is located in northern Montana, where extremely low temperatures prevail in winter, no difficulties have been encountered in operating the process, even under subzero weather conditions.

The inhibitor susceptibility of the treated product is excellent. The addition of 0.007 per cent of U.O.P. inhibitor No. 4 to the finished gasoline increases the induction period by approximately 250 minutes, and the copper dish gum (Atlantic method) of the inhibited gasoline has been consistently below 10 mg.

The saving of tetraethyl lead in gasoline, together with the appreciated value of the product and decrease in gasoline loss, has been approximately $30,000 a year, thus indicating a remarkably short retirement period for the initial investment.

PLANT PRACTICES

Emergency Power for Force-Feed Lubricator

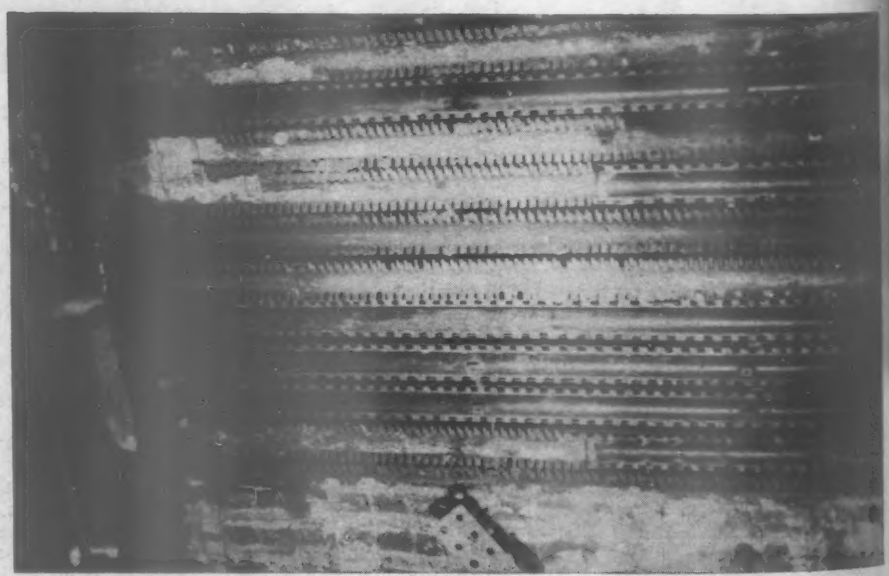
IF supplemental lubrication is required for pumps, or other equipment, a force-feed lubricator can be operated by adapting a small air drill as the motive power. A strap iron cradle bolted to a bench or table supports the air drill, laying down, in alignment with the lubricator operating shaft. An adaptor for chucking the drill to the shaft is attached to the lubricator drive shaft, and the desired speed can be obtained by throttling the air at the most convenient point.

Cable Guide on Cable Drum

ONE of the difficulties in handling a cable on a portable or other drum is the prevention of its "piling up" around one portion of the drum and causing trouble. To avoid this the attachment shown in the photograph was applied by the Standard Oil Co. of Indiana mechanical department. A length of strap steel, ¼ in. thick, 2 in. wide and 3 ft. long, was drilled at one end and bolted to the "near" end of the base, that is, the end over which the cable is taken in or paid out. The strap is also drilled at two points, the lower one about the top level of the inner core of the drum, and the upper at about the level of the outside diameter of the drum. The intervening metal is cut away with saw or torch, making a slot of the required cross-section, say ½ in., and the length indicated. Into the slot is fitted a block drilled with a bevel-edged hole slightly larger than the cable's diameter, and the block is slotted or otherwise fitted to the slot in the upright strap so that the block slides up and down as the diameter of the cable coil increases or decreases as it is taken in or paid out. The guide may be bent at any angle to the vertical that may make its operation easiest; its upper end may be cut into the form of a simple hand grip. When in operation the cable is threaded through the block, one workman stands by and moves the handle slowly back and forth so as to coil the cable on the drum in smooth, one-layer coils, thus preventing its piling up and tangling.

Substitute Spine Tubes

WHEN the original spine tubes in a section of a large boiler developed failure which required replacing, new units of the same type were not immediately available. Substitute tubes were made in the shop by bending similar pipe to the same shape so they could be readily installed. To simulate the many spines on the original tubes, angle iron was welded under code practices to two sides of the tubes. The strips were notched uniformly so refractory application might be retained on the surface of the tubes.



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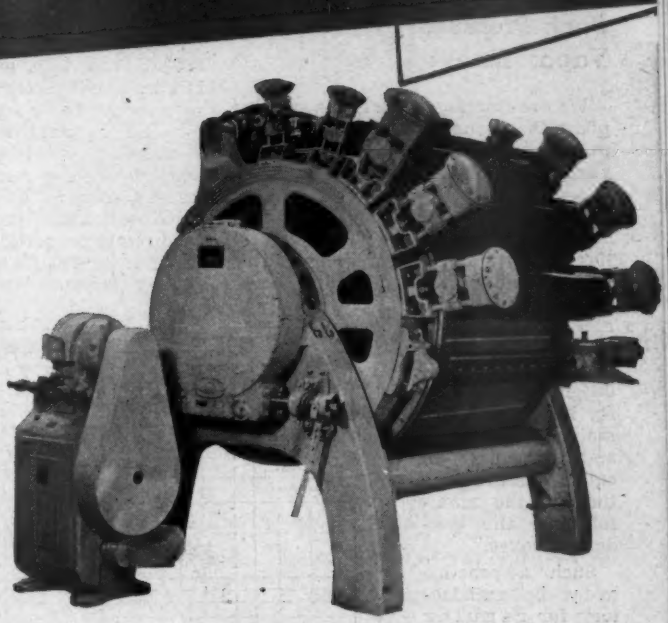

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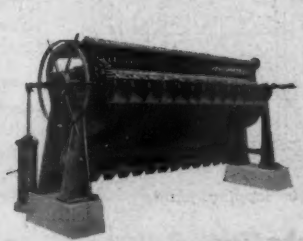

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Back Pressure by Vapor Lines

We are starting to operate a topping plant that cannot have a large back pressure on the towers. What size vapor lines should be used?—L. A. N.

For ordinary-size vapor lines it has been customary to use vapor velocities of 50 to 100 ft. per second. The size of line considered would be 4-in. to 12-in. diameter. Such velocities would produce back pressure of 0.1 to 1.5 lb. per sq. in. through the main vapor line and perhaps an equal pressure drop through the manifolds of the condenser boxes.

Such a practice may be satisfactory for regular operations but it seems that more care is justified in even simple plants. Accordingly two figures for estimating pressure drops are shown in this page. Both of these figures are for 100 (equivalent) ft. vapor lines but Fig. 1 is based on vapor velocity whereas Fig. 2 is based on the pounds of gasoline vapor at 300° F. and 4 lb. gage pressure that can be handled. Obviously, the pressure drop will be somewhat different for other conditions, particularly equipments which employ steam or which operate at relatively high pressures. Lines of other lengths than 100 ft. will cause pressure drops that are directly proportional to the length, i.e., if it be 200 ft. long it will cause a back pressure twice as large as those shown in Figs. 1 and 2. The length referred to here is really the equivalent length. This may be defined as the length of straight pipe plus the equivalent length of straight pipe caused by such obstructions as elbows, tees and valves. The equivalent lengths of such obstructions can be obtained on any chemical engineering textbook or in Petroleum Refinery Engineering, second edition, page 166, McGraw-Hill Book Co., New York.

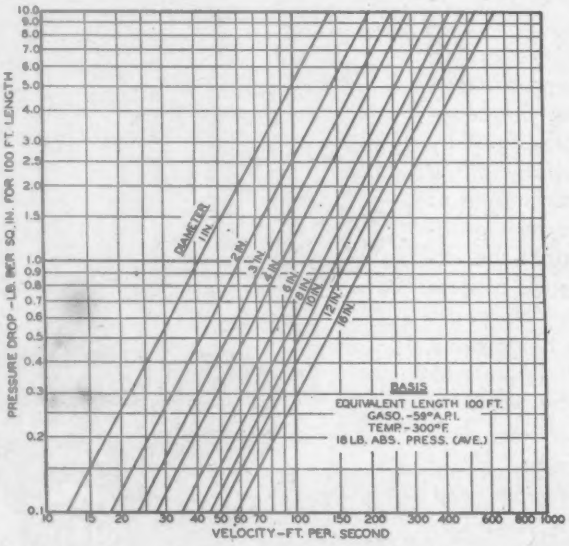

Fig. 1: Approximate pressure drops in 100-ft. vapor lines in topping plants

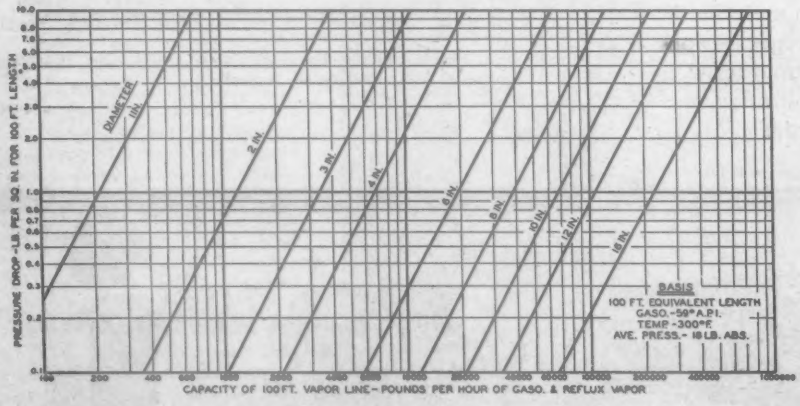

Fig. 2: Approximate capacities of 100-ft. vapor lines in topping plants

The figures are based on the flow of 59 A.P.I. gasoline vapor at a pressure of 18 lb. absolute and at a temperature of 300° F. The gasoline has a molecular weight of 105 and the viscosity is 0.006 centipoise. The figures should not be used for any plants except topping plants.

Example calculation.—A vapor line is to handle 20,300 lb. per hour of gasoline and reflux vapor. The line runs horizontally for 45 ft., vertically for 40 ft., and it contains three elbows.

If an 8-in. pipe is used:

Equivalent length:

Straight pipe	85 ft.
3 ells, 3 × 50 × 8 ÷ 12 =	100 ft.
	185 ft.

Pressure drop (Fig. 2):

1.85 × 0.29 = 0.54 lb. per sq. in.

Fig. 1 indicates that the velocity is about 70 ft. per second. Small additional pressure drops will occur by contraction at the entrance to the line and by expansion into the condenser-box header.

A 6-in. line would cause a pressure drop of 1.76 lb. per sq. in.

Pressure Drop in Pipe Stills

In the second edition of Petroleum Refinery Engineering I find that your example about pressure drop in pipe stills has been left out. Is the method shown in the first edition satisfactory, or why was it left out?—E. C. P.

The example was left out in the second edition because of the difficulty encountered in explaining the somewhat complicated trial-and-error method that must be employed in studying the pressure drop in stills.

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The general method is correct but it should be modified by considering a number of short zones rather than attempt to study whole sections such as the transfer line, or the entire radiant section. Recent computations show that the method is entirely dependable, accurate to even plus or minus 10 lb. per sq. in., if the vaporization zone is studied as a number of short lengths.

The method may be illustrated most easily by considering the transfer line from the pipe still to the fractionating tower or flash tower. No heating is done in the transfer line. Vaporization occurs as the material travels through the line to conditions of lower pressure, and the heat required for vaporization is supplied by cooling of the material.

The pressure drop in the transfer line can be computed without trial-and-error methods, as follows:

1. Consider an unknown length in which say 10 per cent of the stock is vaporized. For a stock which is vaporized to the extent of 60 per cent at the vaporizer section of the tower, the 10 per cent mentioned above would extend from 50 to 60 per cent.

2. Make a heat balance to determine what cooling must have occurred through the zone in order to supply the heat required for the 10 per cent of vaporization.

Heat to vaporize 10 per cent = heat taken from stock by cooling.

No difficulty in selecting physical data arises except that the value of the latent heat of vaporization must be based on an estimate of the average pressure throughout the zone.

3. The pressure at the inlet to the zone can be computed from the temperature of item (2) and the percentage vaporized at the inlet to the zone by use of the flash vaporization curves (at different pressures) of the stock.

4. The average conditions in the zone are now known so that the velocity, density, etc., can be computed for use in regular pressure-drop equations, such as the Fanning equation for turbulent flow. This equation may be used to compute the length of the zone.

5. The same method may be used progressively from zone to zone back through the entire length of the transfer line. The method is exact if the zones are short enough to assume that the velocity in the zone is the arithmetic average of the inlet and outlet velocities. The use of 10 per cent vaporization zones is generally satisfactory unless the total vaporization is less than 20 per cent of the stock. Smaller and smaller zones should be used as the point of initial vaporization is approached.

The same general method is used within the still except that heat is added to the stock through the tube wall. This introduces the length of the zone into the heat-balance computation indicated above in item (2) and hence, the method degenerates into a trial-and-error operation in which the length of the zone must be assumed and then checked by computation until the assumed value is the same as the length required by the computation.

Markers in Wells

A NEW tool of the production engineer is the placing of markers in wells so that a point of orientation and a means of checking depth will always be available. This is extremely important as frequently surface conditions change and often confusion exists as to the exact location of some particular equipment item or a particular formation in the well. If a definite point can be permanently established it can be used as a basis for orientation later.

The markers are established by shooting bullets containing radioactive substances into the formation at points measured with extreme accuracy. The point can then always be found by running a radioactive log in the well. The radioactive log can be run inside casing as well as when no casing is in the hole.

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Dual Completion With Crossover Packer in Dorcheat Pool, Arkansas

by Paul Reed

FOR several reasons, Root Petroleum Co. 1 Farmers Bank & Trust Co., C S½ SW 14-18-22, Columbia County, Arkansas, is unusual among the dual completions of the Dorcheat-Macedonia area. In most dual completions there, provision is made for producing from the Smackover lime at depths of approximately 9,000 ft. and from one of the series of Cotton Valley sand lenses above an approximate depth of 8,000 ft. Because of obstacles encountered in efforts to obtain commercial production in the customary manner, several departures were made from the usual procedures of the area.

Among these is provision for producing from two Cotton Valley sands by dual completion with a crossover packer, making it possible to bring oil from the upper sand to the surface through the tubing. To facilitate this movement, gas-lift operations are now conducted which utilize gas from the lower formation. This is permissible because both upper and lower formations are characteristic sweet formations of the Cotton Valley series.

Producing From Upper Sand

This method was adopted because the 42-gravity oil from the upper sand is produced with a low 200 to 1 gas-oil ratio while gas and 66-gravity distillate from the lower sand is produced with an 18,000 to 1 gas-oil ratio. It was regarded as desirable to arrange for producing oil from the upper sand through tubing so that swabbing, pumping, or gas lift might be safely and conveniently applied when desired. Moreover, installation of the crossover packer was a means of avoiding "cork screwing" of the tubing under conditions of high differential pressure. Tendency to cork screw was also reduced by use of 2½-in. instead of 2-in. tubing between the two packers. Tubing down to the crossover packer is 2-in.

A description of the various steps of completing the well indicates the manner in which routine methods are applied in dual completions in the Dorcheat-Macedonia area and the particular measures which are peculiar to this well. Since the company is contemplating discontinuing producing from the upper sand and seeking production from another more profitable formation in the Cotton Valley series, it may be said that the well is still in the process of being completed.

The status of dual-completion practices and the principal features of procedures followed in the area have been comprehensively described by L. L. Jordon and Alec Crowell in "Dually Completed Arkansas Wells Save Money and Critical Equipment," published in The Oil and Gas Journal, December 16, 1943.

Operations in connection with the Dorcheat well discussed here have been conducted under the direction of George G. Moore, manager of pipe lines and production, Root Petroleum Co. Information in this article was obtained from him and James A. Carson, mechanical engineer of the company.

The well originally tested the Smackover lime and Cotton Valley sand formations. When water was found in the Smackover lime it was decided to produce from two Cotton Valley lenses.

Drilling started December 15, 1942, and the first phase of completion was finished February 5, 1943, for the original arrangement for producing from the lower Cotton Valley sand through the tubing and from the upper sand through the annular space between tubing and casing. On June 19, 1943, installation of crossover packer provided for the present method of producing from the upper sand through this cross-over packer and for utilizing annular space above the crossover packer for gas and distillate from the lower sand.

Perforating Casing

After drilling to a depth of 8,944 ft., an electric survey was made from 6,530 ft. to 8,944 ft. on January 7, 1943. Five days later, casing was perforated with 72 shots (½-in.) from 7,932 to 7,948 ft. at the Cotton Valley sand lens which is the lower of the two formations from which the well now produces. The same cable was used for electric surveying and perforating. Next day a test with the tool open 4 hours 30 minutes, indicated bottom-hole pressure of 2,950 lb.; by flowing through a ¼-in. choke

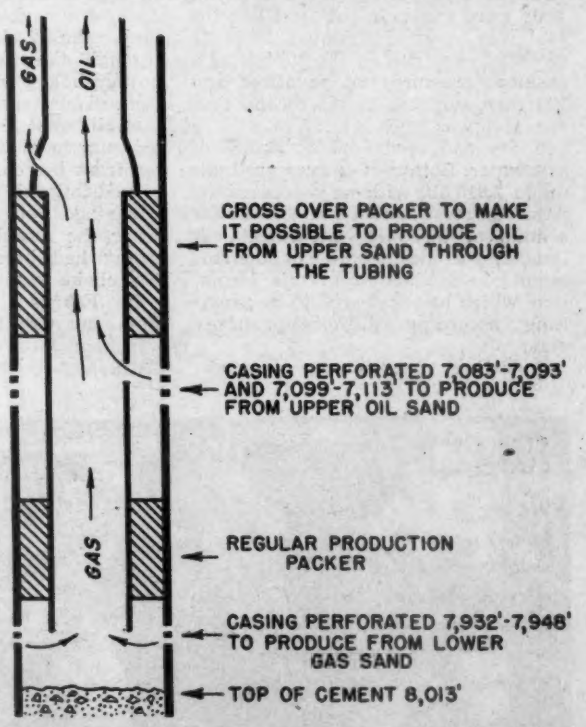

GAS
OIL
GAS
CROSS OVER PACKER TO MAKE IT POSSIBLE TO PRODUCE OIL FROM UPPER SAND THROUGH THE TUBING
CASING PERFORATED 7,083'-7,093' AND 7,099'-7,113' TO PRODUCE FROM UPPER OIL SAND
REGULAR PRODUCTION PACKER
CASING PERFORATED 7,932'-7,948' TO PRODUCE FROM LOWER GAS SAND
TOP OF CEMENT 8,013'

Diagram of packers in dual completion of well described in the article. The function performed by the cross-over packer is indicated without presenting the complicated mechanical features by which production from two formations can be continuously flowed without commingling. Through one set of passages in the cross-over packer gas and distillate from the lower sand go from the tubing to the annular space; through another set of passages in this packer, oil from the upper sand goes from the annular space to the tubing

top pressure was 1,900 lb. This test was conducted to determine whether any squeeze work was needed for the zone.

Drilling had been stopped and casing had been set 10 ft. above the water table in the Smackover lime. Casing in the well consists of 202 ft., 16-in.; 3,327 ft., 9-in.; 8,944 ft., 5½-in. in a telescope string of pipe of three different weights. The appearance of the formation and results obtained by other operators in the area indicated that production could be obtained in the Smackover lime; therefore no test was made after perforating casing with 92 shots (½-in.) from 8,920 to 8,944 ft. in the Smackover lime. After running tubing and packer, swabbing operations showed salt water in the lime. The Cotton Valley formation came in by itself.

Plugging Back

After killing the well with 10½-lb. mud, it was plugged back from 8,943 to 8,843 ft. with 25 sacks of cement to shut off water and it was drilled out to 8,930 ft. As a precaution a packer was set on the concrete plug with the intention of providing a base on which the tail pipe of the regular production packer could rest.

After perforating from 8,919 to 8,925 ft. with 24 shots (½-in.), two tests were made. In the first test the tool was open 45 minutes; 2,000 ft. of water was run in the tubing as a cushion; pressure was equalized and gas flow stopped. In the second test, the tool was open 14 hours; it was run dry and recovered 80 stands of salt water. Bottom-hole pressure built up to 2,915 lb. with no top pressure. After this test, which was the last of a total of three in the Smackover lime, it was decided to abandon attempts to produce from this formation, which had appeared to be promising according to electric-survey data.

Following unsatisfactory perforation and testing from 8,205 to 8,232 ft., a cement retainer was set at 8,060 ft. and the well was plugged back from 8,060 to 7,970 ft. with 15 sacks of cement to plug off two horizons previously tested.

At this time the 7,100-ft. sand appeared to warrant exploitation. Casing was perforated from 7,099 to 7,113 ft. with 55 shots (½-in.) and from 7,083 to 7,093 ft. with 39 shots (½-in.). In testing for 55 hours, bottom-hole pressure built up to 2,625 lb.; water and oil flowed with top pressures of 5 lb., 10 lb., and 15 lb. While swabbing through the tool for 7 hours, oil increased and water decreased which seemed to have come from an outside source during drilling. Subsequently there has been no water produced from this formation until a recent decline in oil production when connate water appeared.

A cement retainer set at 7,209 ft. before perforating the 7,100-ft. lens was drilled out and cement plug was drilled out to 8,013-90 ft., 65 ft. below the lowest perforations at the 7,900-ft. lens to provide space into which accumulations could drop.

Side-Door Choke

Equipment run in the hole with tubing and regular production packer included the body for a side-door choke and backoff nipple. After swabbing, the 7,900-ft. sand produced through the tubing with sufficient bottom-hole pressure, after mud had been displaced with fresh water. But the oil sand did not have enough pressure to blow out 7,100 ft. of water from the casing. The means employed to get it out was utilization of advantages of the side-door choke. After the annular space inside the casing had been cleaned, the side-door choke was closed by blanking off.

On February 5, 1943, production from the two Cotton Valley lenses was turned into the tanks. Gas and distillate from the 7,900-ft. sand were flowing through a ¼-in. choke; a 2,400-lb. pressure was on the tubing. No pressure was observed on the casing but oil from the 7,100-ft. sand was flowing in heads.

Producing from the oil sand was not permitted by PAW until a change in regulations on May 22, 1943. Until then only gas and distillate from the lower sand were produced. While only gas was produced it was noticed that casing pressure increased gradually. After production started from the upper oil sand, an increase in the gravity of the oil was observed. A conclusion was reached that either the packer or the side-door choke was leaking. When tubing was pulled with a workover rig the tubing was found to be cork screwed as a result of the high pressure below the packer.

The side-door choke was eliminated by the company and a crossover packer was installed which is provided with two sets of passages. One of these provides for movement of oil from the annular space to the tubing by which it goes to the surface. The other set of passages is designed to facilitate flow of gas and distillate from the tubing below the packer to the annular space above the packer.

A pump-seating nipple was installed above the crossover packer. The regular production packer was set 30 ft. above perforations of the lower sand; the crossover packer was set 30 ft. above the upper sand. When oil production declined and salt water increased January 23, 1944, it was decided that ultimate recovery would not justify installation of a pumping unit for pumping at such a depth. But with 1,900 lb. of gas pressure available through the casing, the company felt justified in utilizing gas lift.

Gas-Lift Operation

Therefore gas lift in three stages spaced 1,000 ft. apart was adopted. For this operation 1-in. tubing was run inside the 2-in. tubing. At the bottom of the 1-in. tubing at a depth of 7,000 ft. there is a perforated nipple. Stages at intervals of 1,000 ft. are numbered 1, 2, and 3 with No. 3 stage valve the lowest at a point of 1,000 ft. above the perforated nipple. Although the gas pressure was not sufficient to lift salt water from the bottom of the well it was capable of lifting from No. 1 valve. At the start all valves were open. Valves No. 1, 2 and 3 can be closed successively by lifting the tubing. This is the only gas lift in the Dorcheat field.

In the near future the company plans to test four more zones in this well. Experience with this well indicates to the company that solutions applied to the problems encountered were suitable for the various situations. The advantages of a crossover packer for a low pressure upper sand in a dual-completion well have been demonstrated.

Handling tubing during testing for dual completion in Dorcheat-Macedonia area, Arkansas

Servicing Fuel-Injection Nozzles

*by Dr. P. H. Schweitzer**

The most serious problem in diesel-engine maintenance and operation is the proper care of the nozzles which inject the fuel into the cylinders. This article deals with the causes of nozzle trouble, preventative steps, testing, diagnosing, correction and cleaning of nozzles, the freeing of stuck needles and reassembling of the injectors. This is a condensation of an article printed in the Bureau of Ships Bulletin of the U. S. Navy Department and is published here by permission because of its value to users and operators of diesel engines in the production and drilling branches of the oil industry.

THE most common servicing operation on a diesel engine is the checking of injection nozzles. It corresponds to checking of spark plugs in earlier automobile engines and troubles are at least as frequent. But the identification of defective nozzles is not quite as simple, and correction other than replacement not always possible.

What makes nozzles go bad? The main factors are dirt, heat and water. In open nozzles there is no valve seat or stem, and dirt can only clog or erode the orifices. Even slight erosion reduces the injection pressure appreciably. Clogging has the opposite effect. The spray form and distribution suffer.

With closed nozzles a most serious effect of dirt is the sticking of the needle in its guide. The lapped fittings of injector valve stems and pump plungers operate with clearances of the order of 0.0001 in., and a minute amount of dust or dirt can cause seizure. Both timing and atomization will be destroyed. A single dust particle can destroy the valve seat so that the valve will not seal and fuel leaks into the cylinder when the nozzle valve is closed. This fuel is not atomized and causes incomplete smoky combustion and carbon deposits on the nozzle (craters) and in the combustion chamber.

Erosion of the stem and guide in a closed nozzle causes fuel leakage into the leakoff line. This may cause unequal fuel distribution among the cylinders.

Poorly cooled nozzles or an overloaded engine cause overheated nozzles so the fuel is cracked and hard carbon deposits and varnish form. Deposits outside the nozzle orifices destroy the spray shape. Deposits on the valve seat or stem cause leaky valves, stuck stems or both.

Water in the fuel causes corrosion, resulting in enlarged nozzle orifices, stuck needle valves, etc. Nozzle troubles from other causes, such as breakage of parts, are relatively rare.

Prevention of Nozzle Troubles

The surest way to prevent nozzle troubles is to insure that only clean fuel gets to the nozzle and that the nozzle does not overheat. To avoid trouble by dirt and water in the fuel the following should be observed: (1) Buy clean fuel or centrifuge and filter fuel before using; (2) use a two or three-stage filtering system between fuel supply and injection pumps; (3) drain filters and strainers of water at regular intervals; and (4) observe maximum cleanliness when disassembling and reassembling nozzles.

Fig. 1 shows a typical filtering installation. The primary stage consists of a duplex metal-edge strainer which removes heavy particles. The final stage must be a sealed or a cartridge-type filter which removes particles of a fraction of a thousandth of an inch. Dirt and dust should be prevented from getting into the filter when the elements are changed.

Many injection nozzles have a metal filter in the holder or attached integrally to the nozzle. These are effective but they cannot be depended on for complete protection.

Whenever an injector nozzle is detached from the line or the line is detached from the fuel pump, the connection should be thoroughly cleaned with kerosene or fuel, ends of the line should be covered with cloth to prevent entry of dirt, parts should be handled carefully and cleaned with naphtha, acetone, carbon tetrachloride or petroleum ether, blown through with clean air and dipped in clean fuel before assembly.

Heating troubles can be prevented as follows: (1) Avoid overloading engine for long period; (2) avoid cooling-water temperature in excess of manufacturer's recommendation; (3) insure good metallic contact between nozzle and the well-cooled part of the cylinder head; (4) employ liquid-cooled nozzles where necessary; and (5) run on light fuel oil a few minutes before stopping an engine operating normally on heavy fuel.

Checking of Nozzles

Nozzle troubles should be suspected when (1) engine smokes without overloading; (2) engine loses power;

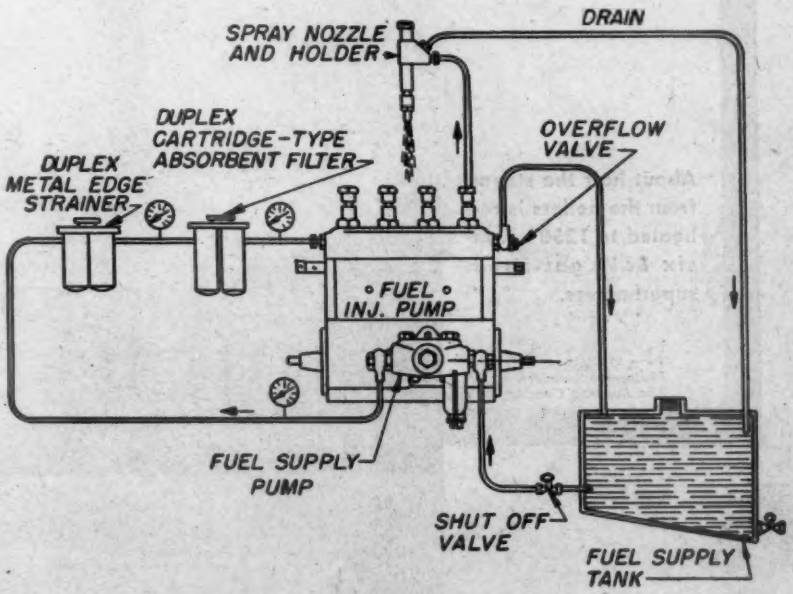
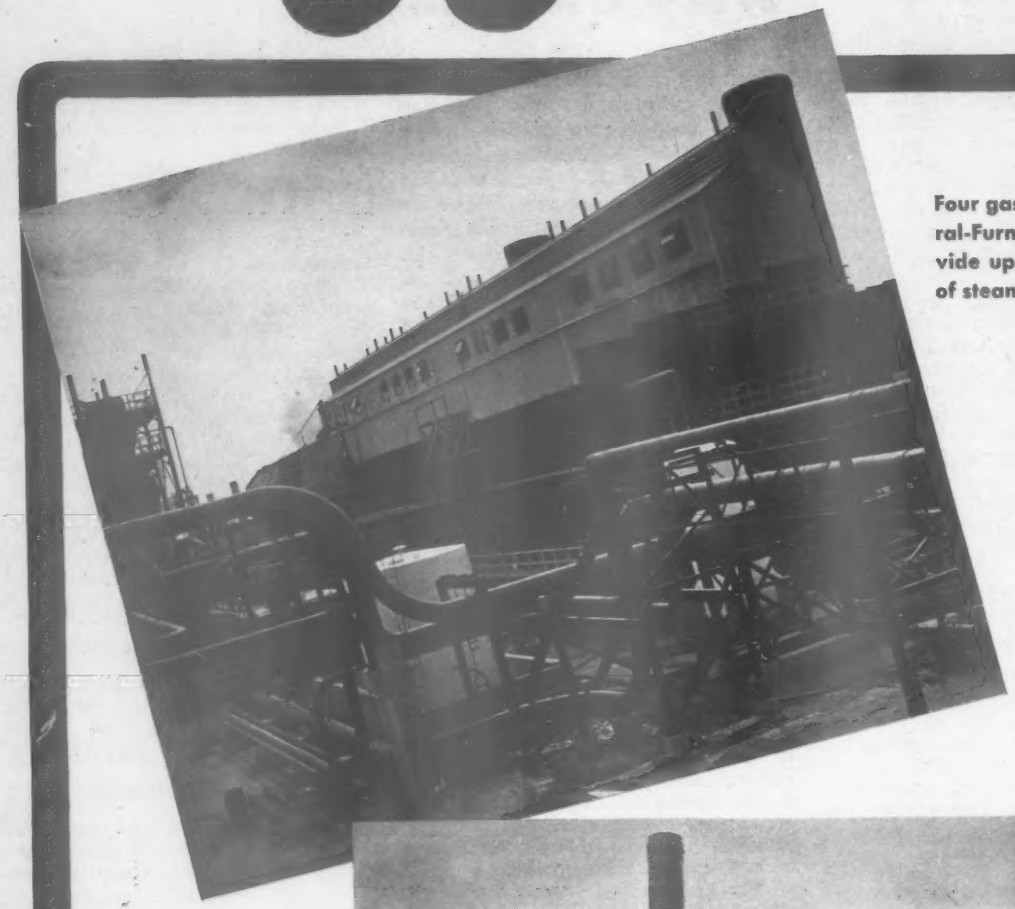


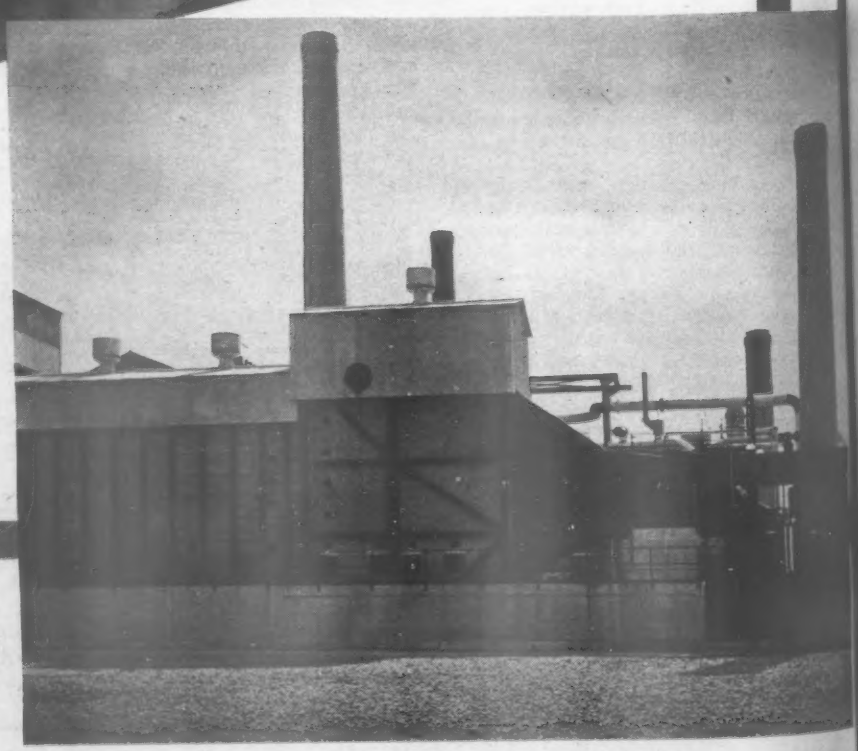
Fig. 1: Typical forced-feed fuel-supply system

*Professor of Engineering Research, Pennsylvania State College.

50 MILLION P



Four gas-fired B&W Integral-Furnace Boilers provide up to 50,000,000 lb. of steam a day at 450 psi.



About half the steam from the boilers is reheated to 1250° F. in six B&W gas-fired superheaters.

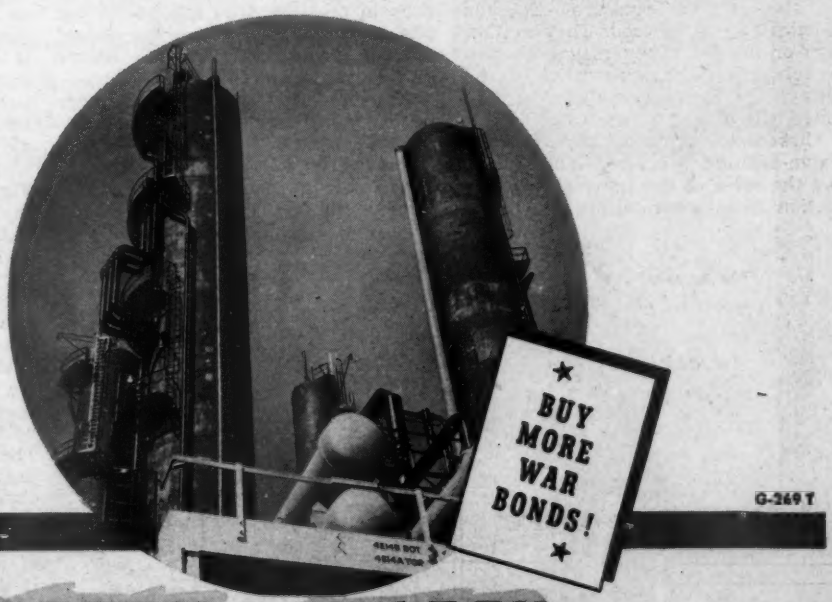
Photographs courtesy of The Lummus Company

POUNDS OF STEAM *to* BOOST BUTADIENE *Production*

The butadiene plant at Port Neches, one of the world's larger plants, is designed to produce 100,000 tons of butadiene annually—enough for one-seventh of the government's war-time program for vital synthetic rubber production. This plant provides a strange new skyline for this part of Texas, with steel fractionating towers rearing their tops as high as a 17-story building.

The 50,000,000 pounds of steam required daily for high-temperature heating processes, low-temperature boiling, and for power drives will be provided by 4 B&W Integral-Furnace boilers of central-station size. About half the steam from the boilers is re-heated in specially designed separately-fired superheaters of B&W manufacture, in which the temperature is raised to the high degree necessary for dehydrogenation of butylene, the most difficult step in the process.

To the originators of this important project and to The Lummus Company, designers and builders of the plant, go the sincere congratulations of this Company for the spirit in which it was undertaken, organized, and carried out. We are proud that we were called upon to contribute to the project from our experience with high-temperature steam problems and fabrication of welded pressure vessels.



Sky-scraping fractionating towers were fabricated on the site from steel plate under B&W supervision in a specially constructed shop, the design and erection of which were supervised by B&W engineers.

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(3) exhaust pyrometer reads too high or too low; or, (4) engine knocks on one cylinder.

Some injectors are provided with a "feeler pin" with a stem in contact with the injector needle. Press the finger on the feeler pin while the engine is running and a sharp kick will be felt at every revolution if the injector is working properly. No motion or a feeble one indicates improper operation and probably sticking. If there is no feeler pin, one may press the injector line with thumb and forefinger and feel the pulsations. The suspected nozzle can be shorted out by opening the bleeder valve or the line connection and if there is little or no drop in power output, the nozzle is defective.

After a defective nozzle has been located it has to be taken out of the engine and examined in the nozzle tester. Sometimes it is desirable to remove all nozzles and test them.

Nozzle Tester

The nozzle tester is a hand pump capable of producing pressures up to several thousand pounds per square inch, having an attached pressure gage and a short line to attach the nozzle. Fig. 2 shows the principle of the nozzle tester. Nozzles can be tested for (1) valve-opening pressure; (2) spray appearance; (3) leakage; (4) popping, and (5) chattering.

Not all types of nozzles need to be tested for all these items. For the purpose of testing, nozzles can be classified as open nozzles, closed nonpopping nozzles, closed popping nozzles, and mechanically operated nozzles.

Valve-opening pressure of open nozzles can be ignored. They neither pop or chatter. They may be tested by observing the appearance of the spray; if it is unsymmetrical or lopsided, the nozzle is defective.

Closed nozzles must be checked for valve-opening pressure. While moving the level of the tester slowly, injection must occur within the limits specified by the manufacturer. This may be as low as 1,200 lb. per sq. in. for some nozzles and as high as 4,000 lb. per sq. in for others. Most nozzles can be adjusted for valve-opening pressure.

Nonpopping closed nozzles must also be checked for leakage. Press down on the lever of the tester until a pressure just short of the valve-opening pressure is produced. If drops, a dribble or a jet appears below that pressure, the valve is not seating properly. Thorough cleaning usually corrects the trouble. If it does not, the defective valve parts must be replaced. As a rule, the mating parts have to be replaced together and this sometimes involves the replacement of the whole nozzle.

All inwardly opening and many outwardly opening closed nozzles are of the popping type. They open with a snapping sound reminiscent of the popping of popcorn. The needle should stay on its seat until it pops, when a quick burst of spray should issue from the tip, accompanied by a quick drop in pressure. The absence of the pop at a pressure above the valve-opening pressure indicates a nozzle of this type is defective.

A poorly seating valve manifests itself by leakage through the nozzle orifice. Hold the pressure slightly below the valve-opening pressure and watch the nozzle tip. If drops form on the tip, the nozzle leaks; if a solid jet appears, the nozzle leaks badly. A nozzle need not necessarily be discarded on account of a slight leakage that wets the nozzle tip. At high-speed operation corresponding to the engine's speed such leakage will be insignificant. But, if the nozzle fails to pop even at fast pumping, it is defective. It also requires servicing if it forms a solid jet before popping, or if stray streams known as flags appear coming from the nozzle, or if it dribbles badly. It is difficult to set up hard and fast rules on the evaluation of nozzle tests. The best method is to compare the suspected nozzle with others in good condition which give satisfactory performance. Fig. 3 illustrates the appearance of the spray in typical good, bad and indifferent nozzles. Indifferent, and occasionally positively bad, nozzles sometimes give satisfactory performance in the engine.

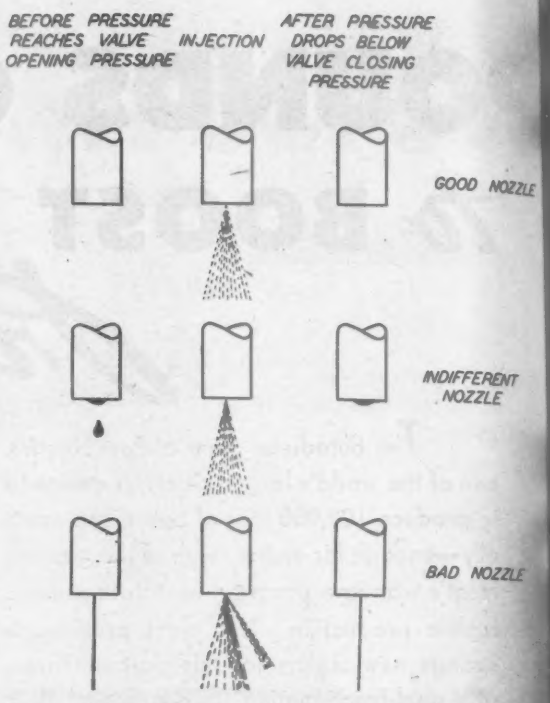

Fig. 3: Characteristics of sprays from spring-loaded nozzles

A popular way of testing a popping nozzle is by making it chatter. Press down on the lever of the nozzle test pump with a medium-low speed and a purring or buzzing sound will be heard that is called "chatter." The chatter consists of alternate opening and closing of the valve. By changing the rate of movement of the pump lever one can produce one pop, two pops, three pops or a row of pops which constitute a chatter. If the nozzle valve is leaking badly, or the nozzle stem is stuck, or the spring is broken, the nozzle cannot be made to chatter. If a popping-type nozzle fails to chatter, it needs attention.

In addition to pumping speed,

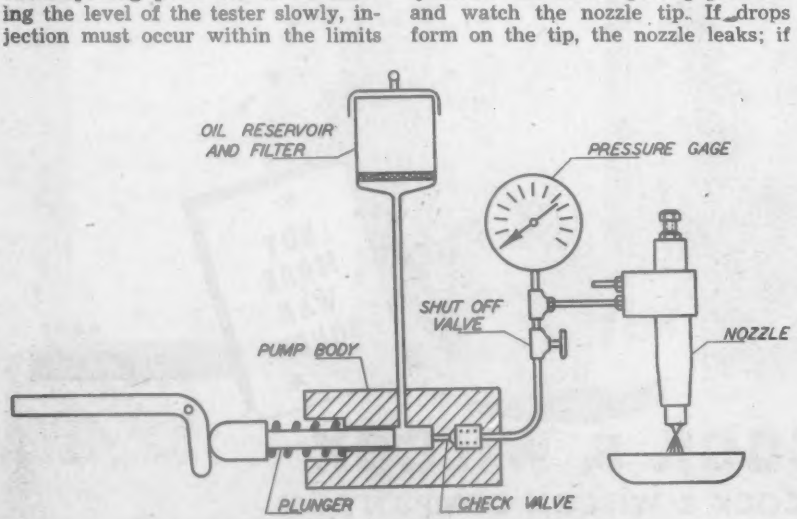

Fig. 2: Illustrating the principle of the nozzle tester

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course it doesn't. Your cut oil treatments are just as good, bably better than the other fellow's. But if you haven't ady done so, you do owe it to your business and your cketbook to investigate Dehydro compounds. Oil companies, ge and small, everywhere can tell you how well, quickly and nomically these modern treating compounds convert the ghest emulsions into good, clean crude. Their profitable r experience can soon be yours if you call in the skilled hydro technician serving your area. Why not find out now t his expert counsel, Dehydro laboratory research and oved Dehydro compounds can do for you?

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valve-opening pressure, orifice size, etc., the frequency of the chatter depends also on the oil volume between the pump and nozzle. Decreasing that volume will make the pitch of the chatter rise and vice versa.

Chattering is not a complete test. Leakage before injection and spray appearance should be observed at any nozzle testing.

If no nozzle tester is available the injection pump on the engine may be used for the same purpose. Remove the nozzle from the cylinder and pry the corresponding pump plunger with a screw driver to cause injection from the nozzle.

Mechanically actuated nozzles can also be tested with the nozzle tester for tightness of valve seat and needle guide but for spray observation a special fixture, including the cam mechanism, has to be provided.

Caution!—Keep hands away from the fuel spray as it is strong enough to penetrate the skin and flesh and cause severe blood poisoning. Consult a physician, particularly if the inflammation is visible.

Diagnosing Defective Nozzles

It is comparatively easy to diagnose the trouble with a defective nozzle. It generally falls in the following categories: (1) Incorrect spring tension; (2) defective valve seating; (3) stuck valve stem; (4) eroded valve stem; (5) defective orifice; (6) clogged and carbonized tips; and (7) broken spring and valve parts.

If the valve-opening pressure is too high, reduce the spring tension; if too low, increase it.

Defective valve seating is shown by leakage and dripping from the orifice at a pressure below the valve-opening pressure. The cause may be dirt on the valve seat or an injured or worn valve or seat. The trouble can usually be located by a low-power microscope (20 to 30 magnifications).

If the needle is stuck, the nozzle action will be insensitive to the settling of the spring load. The needle should be examined for free motion in the guide. If the needle is tight or cannot be moved at all with the fingers, both needle and guide must be replaced or corrected.

An eroded valve stem causes a rapid pressure loss when the nozzle tester is shut off from the line after the pressure has been raised to a convenient magnitude. The lapped surfaces should be carefully examined for scratches, scarring and burrs.

Defective orifices may be detected with the low-power microscope. If the hole is not circular, the edges burred or ragged, or the pintle nonconcentric, the spray will be unsatisfactory.

Clogged passages or orifices can be located by visual observation of the spray and by blowing through the nozzle. The clogging material, carbon dust or metal chips, can be eliminated by a proper-size music wire.

Carbonization of the nozzle tip and hard deposits forming on its exposed surfaces originate from incorrect fuels or overheated nozzles. Nozzle orifices can be eroded by salt-water contamination of the fuel.

After the nozzle trouble has been diagnosed, the remedy is either simple or impossible. For setting of spring tension, an adjusting screw with jam nut is usually provided. In the absence of adjusting screw, the spring tension of some nozzles can be changed by grinding off the spring or placing a thin washer under it. Nonadjustable nozzles have to be replaced and spring adjustment on them should not be attempted.

Cleaning of Nozzles

Dirt is the most frequent cause of untight valve seating. A good cleaning procedure is to wash the parts in a clean glass dish with petroleum ether, carbon tetrachloride or acetone. Wood sticks soaked in oil and a soft brass fire brush will remove sticky matter. Hard or sharp tools or abrasives should be avoided. After washing, parts should be blown by air but not by mouth. After blowing, parts should be bathed in clean fuel oil. Parts should be laid on clean smooth-surfaced paper on rags. Mating surfaces, like valve stems and seats, should not be touched by hand.

If cleaning fails to correct the leakage, an attempt should be made to lap the needle to its seat by turning back and forth and alternately lifting it. A holder (Fig. 4) or the fingers can be used. No abrasives should be used, only clean oil or, in extreme cases, a little liquid metal polish. Lapping for a few minutes frequently restores good seating. On the other hand too-long lapping or the use of an abrasive may destroy the seat completely. There is about 1° difference between the apex angle of the conical seat and the valve cone in order to approximate a line contact, which is necessary for sealing. Overlapping eliminates that angular difference.

If the needle requires considerable lapping to make it smooth, a dummy should be used (Fig. 5). The lapping tool should have just the right apex angle and the needle can be lapped into it with a fine abrasive, such as aluminum-oxide lapping powder, holding the needle in a lathe. A dummy needle with proper apex angle can be used to restore smoothness to the seat (Fig. 6). After that the needle and body can be lapped together with clean oil.

Fig. 4: Holder for lapping injector needle to seat

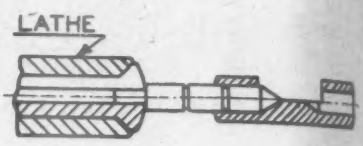


Fig. 5: Lapping tool for injector needle

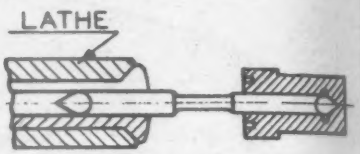


Fig. 6: Lapping tool for nozzle-valve seat. These three illustrations courtesy General Machinery Corp.

If the tools above are not available and simple lapping does not produce satisfactory seating, the needle and guide, including the valve seat, should be replaced together as these parts are not individually interchangeable.

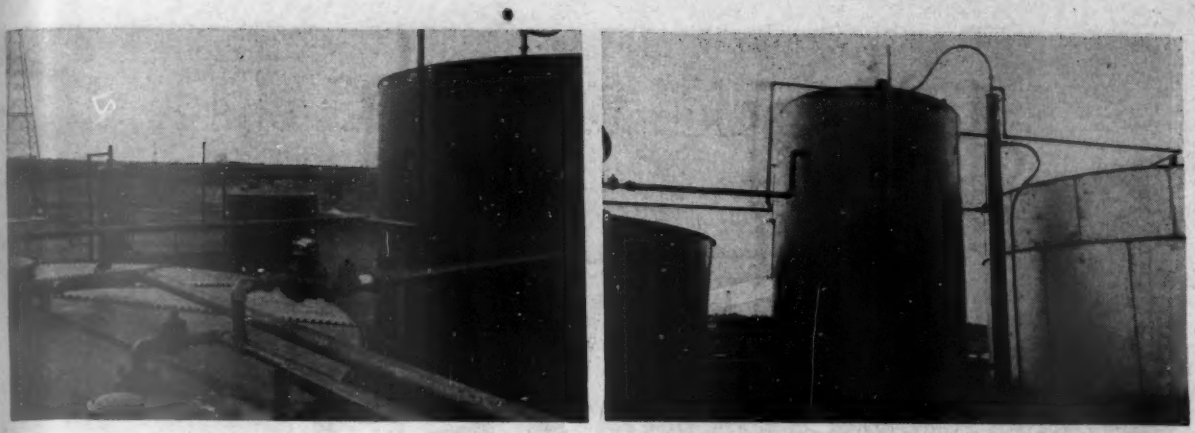
A needle stem may stick in its guide from a little occasional dirt getting in between, or from varnish or cracked material. Do not attempt to remove by force but soak the nozzle in acetone for awhile, say overnight, and then free the needle gently by turning the body around it. Clean the needle and nozzle body thoroughly. If the needle still does not move freely in the body it is probably distorted and should be replaced. Bluish discoloration of the needle and nozzle tip is a strong indication of excessive heat which should be remedied by insuring better cooling of the nozzle. This may require reaming out of the nozzle-holding seat in the cylinder head.

Corroded valve stems cannot be corrected and should be replaced together with the guides. The same is true of damaged or defective orifices, broken springs and other parts.

For cleaning clogged orifices, music wire of a size slightly smaller than the orifice should be used. Large wires, match sticks or special reamers may be used for large passages.

Clean every part as described before reassembling the injector. Use only the proper wrenches at moderate pressure in assembly. Special tools should be employed.

In some cases when the nozzle is located by dowel pins, special care must be taken not to force the holding nut off or on, as forcing may sheer the dowel pin. The best way is to hold the injector in a vertical position and apply pressure on the end of the nozzle while turning the nut. Use the wrench sparingly.



Left: Meter on discharge from gun barrel registers net clean oil going to stock tank. As the total fluid has already been measured it is a simple matter to determine the amount of water produced with the oil. The 50-bbl. test tank can be seen directly behind the meter. Right: The 750-bbl. power oil tank at right is kept full of oil at all times as the line between it and the gun barrel is slightly lower than the line to the stock tanks

Central Metering and Separator Batteries

(Continued from page 63)

from the Simpson formation at approximately 7,220 ft. and three produce from the Caddo lime at 6,100-6,200 ft. As more wells are added, only additional separator and metering equipment will be required to care for the production.

In the Hildreth pool Continental has one centralized battery into which 10 wells, 1 of them a dual completion, are produced and another into which 5 wells are produced. Each battery includes the appropriate number of separators and meters and the former has three 1,000-bbl. stock tanks and the latter two 1,000-bbl. tanks. One takes care of the production from seven leases and the other four leases. Wells connected to the larger battery have an allowable of 51 bbl. each but the smaller battery is connected to wells with a new-pool allowable of 140 bbl. per day. Both batteries can be expanded to take care of more wells by simply adding the necessary lines, separators, and meters.

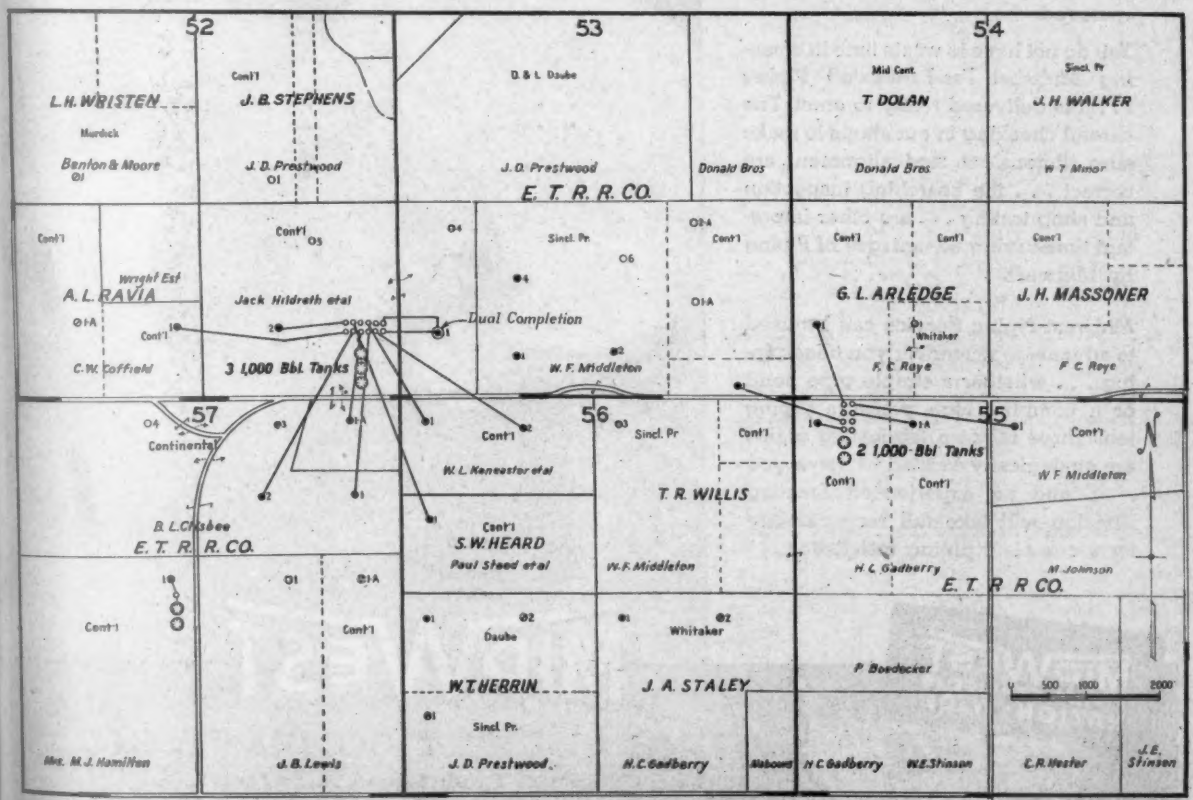


Fig. 4: Map of Hildreth area in Montague County, Texas, showing location of wells in relation to centralized tank batteries. Separator and meter for each well are at tank battery. Longest lead line is approximately one-half mile. Allowable of wells at left is 51 bbl. per day each. Wells at right have new-pool allowable of 140 bbl. per day each

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Piping subassemblies that are pre-fabricated by Midwest are thoroughly cleaned before leaving our various plants. All scale, dirt and other accumulated impurities that otherwise would cause serious damage to valves, turbine blading, etc. are removed.

You do not have to waste time in cleaning Midwest Pre-Fabricated Piping . . . it is delivered ready to erect. The careful checking in our shops to make sure dimensions and alignment are correct . . . the searching inspection and shop testing . . . are other important time-saving advantages of Piping by Midwest.

• • •

Midwest Piping Service can be used to advantage whenever you need piping . . . whether a simple pipe bend or a complex high pressure piping job. Three modern fabricating plants are strategically located to serve you . . . and an experienced Erecting Division will take full responsibility for a complete piping installation.

MIDWEST

PIPING & SUPPLY COMPANY, INC.

ECONOMIC FACTORS AFFECTING SUCKER-ROD REPLACEMENT

FORMULAS for determining the economic life of a sucker-rod string and the optimum date of replacement usually break down over wide areas of operation and different operating conditions. Consequently, replacement of sucker-rod strings is usually left to the judgment of the operator. Although decisions and policies concerning rod replacements are usually based on some type of cost analysis together with operating data, individual judgment and so-called "horse sense" are still pertinent factors as is evidenced by the varying replacement policies followed by different operators.

The cost of a sucker-rod string at any time after installation involves such factors as initial cost, depreciation, interest, repair expense and loss in production from down time due to rod failures. Unlike other pieces of equipment where future repair expense can be predicted with some degree of certainty, the number of sucker-rod failures likely to occur by any future data can be forecast only in rare instances. Various attempts have been made to correlate rod failures with the number of stress reversals in actual operation and the fatigue endurance limit of the rod. Due to changing operating conditions, varying degrees of fluid corrosivity, lack of adequate records and other factors, these studies are not yet applicable to actual field conditions.

In order to determine where replacement policies should be followed, many operators keep detailed records of sucker-rod breaks and expense incurred. By comparing records from year to year and determining the average sucker-rod costs for any particular area of operation, it is usually a simple matter to determine the period at which repair expense becomes excessive. Such studies are usually based on a large group of wells with similar operating characteristics.

Other than those failures which may have been caused by damaged rods, sucker-rod breaks are usually due to fatigue and breaks in any particular section of the string are inevitably followed by other failures. This fact usually permits the formulation of some type of policy concerning replacement. For instance if three sucker-rod breaks within a 500-ft. section have occurred within 1 month, the 500-ft. section and from 100 ft. to 200 ft. above and below the bed section might be replaced.

Many of the larger companies have adopted such policies in order to eliminate personal judgment, and to reduce the amount of necessary cost studies. These policies may vary in different areas of operation.

A typical analysis of sucker-rod-repair expense and loss in production due to failures is shown in Table 1. These figures cover only 2 wells of a larger group of 20 wells on which data were accumulated.

The wells which were all in the same area of operation, were heavily loaded, and sucker-rod-repair expense was substantial. Previous to November 1940, sectional replacements were made if more than three failures occurred within a 30-day period. In November 1940 this policy was changed so that replacements were not made unless five failures had occurred within a 30-day period.

The average monthly sucker-rod repair expense for 20 wells affected by this program is shown in Fig. 1. Since all material replacements were charged to rod-repair expense, the chart, in general, indicates the sucker-rod costs at these wells. It will be noted that repair expense increased sharply after the policy was changed and from an economic standpoint, more liberal rod replacements were desirable. Many operators at the present time make every effort to conserve material and in many instances this means that the equipment is operated past the economic limit.

Since these wells were in an unprorated area, any loss in production due to sucker-rod failures should also be taken into consideration. An analysis of this down time and value of lost production for two of the wells is shown in Table 1.

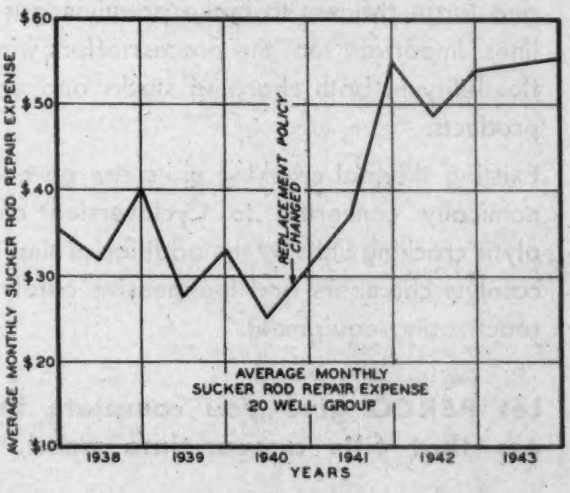
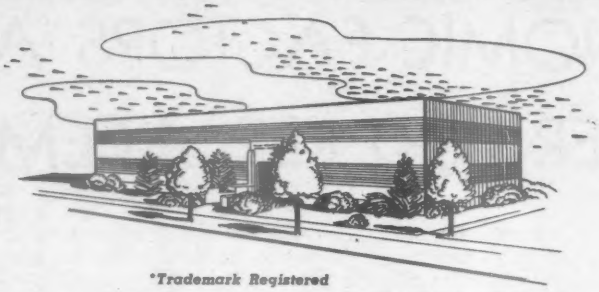


Fig. 1

TABLE 1—ANALYSIS OF SUCKER-ROD-REPAIR EXPENSE AND LOSS IN PRODUCTION

Well	Year	Days operated	No. of sucker-rod jobs	Loss in prod. (bbl.)	Value of lost prod.	Total rod-repair expense	Expense, repairs and prod. loss
"A"	1938	341	10	61	$58	$435	$493
	1939	337	8	61	58	365	423
	1940	328	13	90	82	532	614
	1941	332	26	210	192	995	1,187
	1942	319	22	177	162	917	1,079
	1943	326	28	260	238	1,093	1,331
"B"	1938	311	4	43	39	156	195
	1939	293	3	43	39	132	171
	1940	322	7	82	75	288	363
	1941	313	12	154	141	505	646
	1942	303	18	202	185	718	903
	1943	318	17	202	185	673	858

CYCLOVERSION*



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This new catalytic process enables both small and large refiners to make premium gasolines. Important too, the process offers wide flexibility in both charging stocks and end products.

Existing thermal cracking units can be economically converted to Cycloversion catalytic cracking units by the addition of simple catalyst chambers and inexpensive catalyst reactivating equipment.

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1. **The simplicity of the fixed catalyst bed.**
2. **Simplicity of design and ready convertibility of existing refinery facilities which permit substantial savings of critical materials.**
3. **Long process periods permit operation without the use of costly automatic cycle control equipment.**
4. **Rugged, long-lived and inexpensive catalysts.**
5. **Flexibility with respect to charge stocks and products.**
6. **Low investment and operating costs.**

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A *Division* OF

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Discovery Well, Scott & Hopper Pool, Brooks County, Texas

HUMBLE OIL & REFINING CO. 1 SCOTT & HOPPER.

NE SE A.C.H.&B. Survey 107; 4 miles northeast of Alta Mesa field

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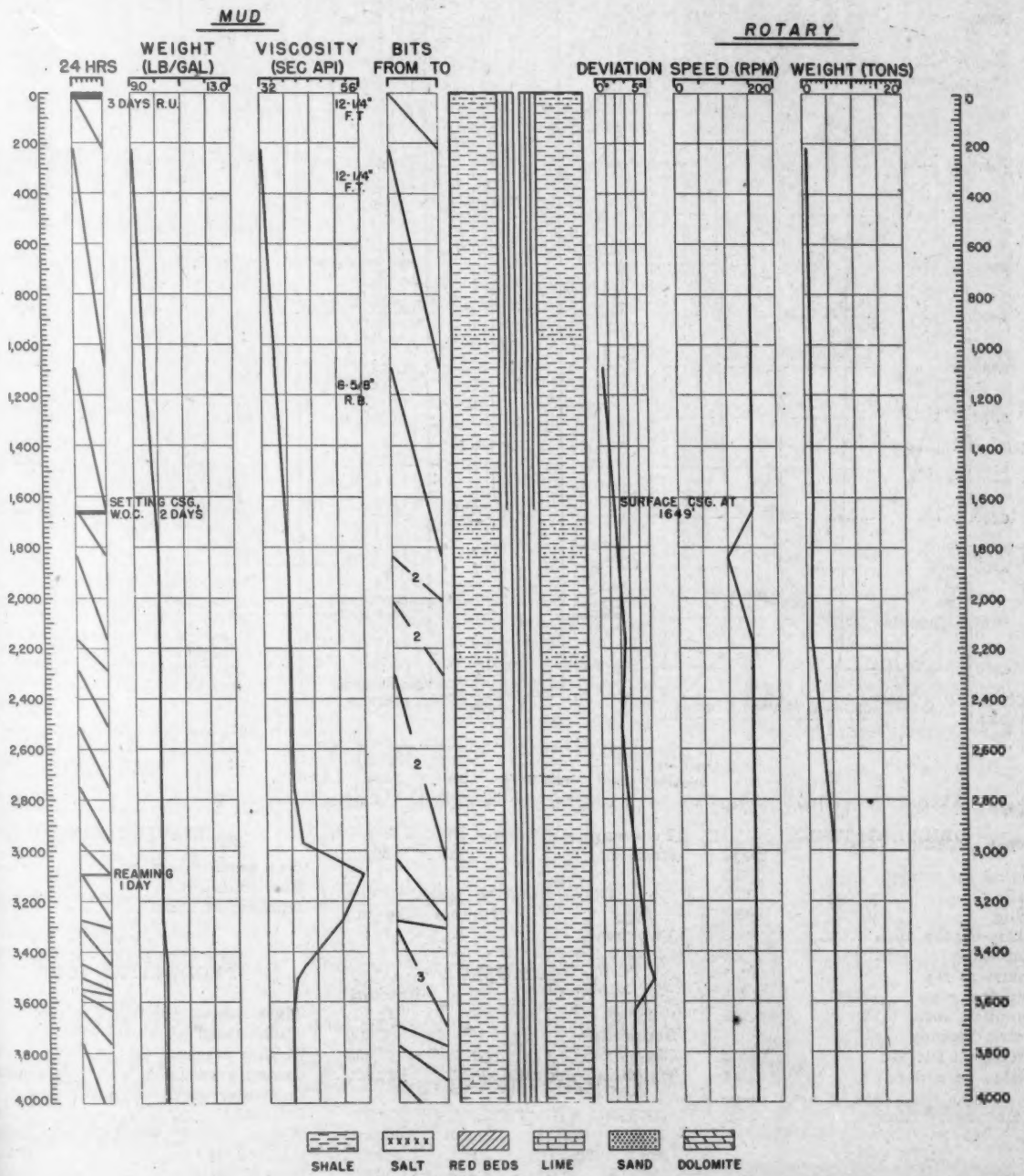
Company Rig



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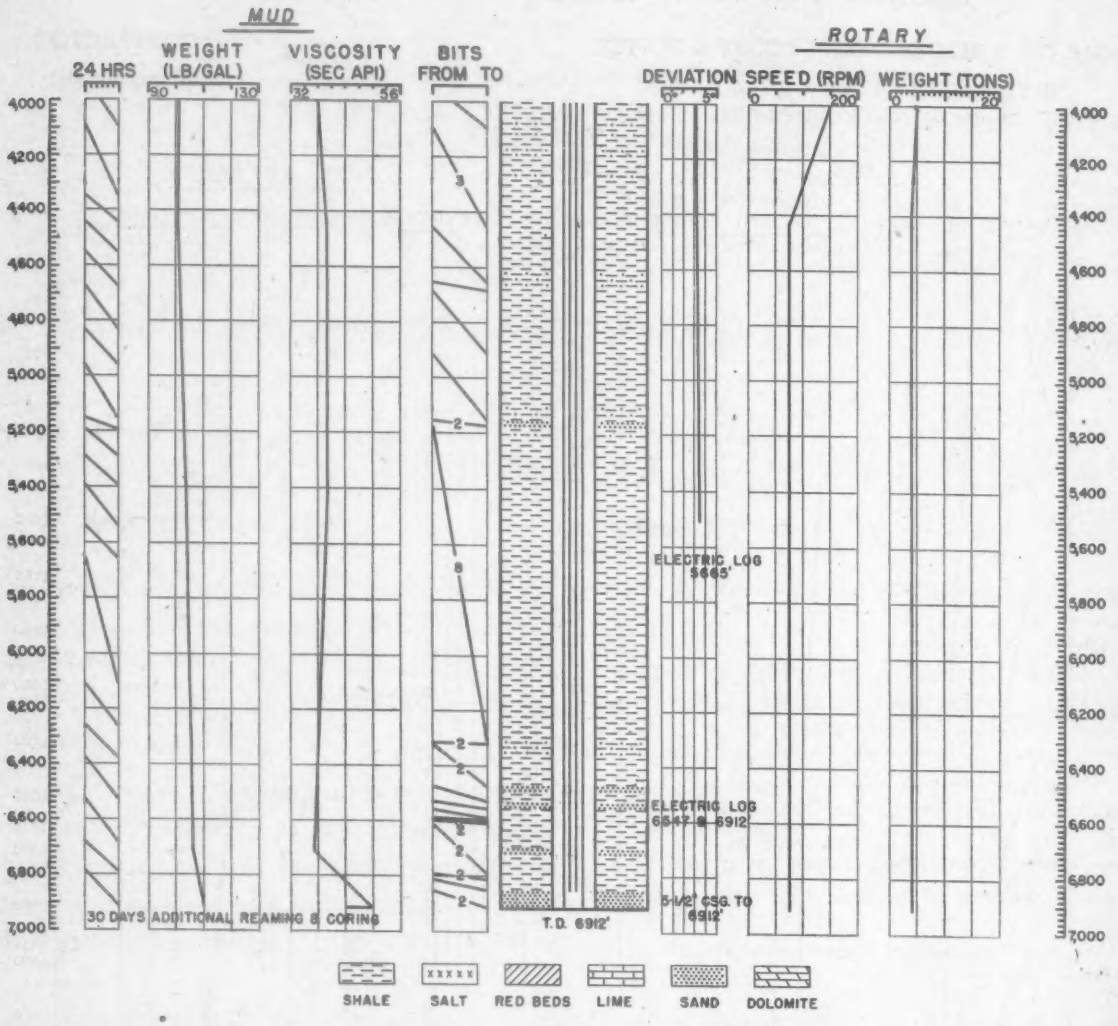
Journalog

Discovery Well, Scott & Hopper Pool, Brooks County, Texas (Continued)



DRILLING TIME

	Days
Rigging up rotary	3.5
Drilling	33.6
Coring	20.9
Setting casing and W.O.C.	4.6
Completing	5.6
Repairs to rig	3.7
Deviation tests	0.5
Formation tests	6.6
Electric logging	1.1
Waiting on fuel	1.0
Waiting on orders	0.9
Total rotary time	82.0

BITS USED

Type	Number	Size (in.)
Fish tail	2	12¼
Two-way	12	8⅝
Rock bit	4	8⅝

CORE HEADS USED

Type	Number	Size (in.)
Two-way	32	7⅞

MUD USED

Type—	Amount (lb.)
Bentonite	2,000
Clay	200
Weighting material	138,000

CASING AND TUBING RECORD

Size (in.)	Weight (lb./ft.)	Depth (ft.)	Cement (sacks)
10	36.0	1,649	1,300
5½	17, 14, 15.5	6,912	600

COMPLETION

Gun perforating (hr.)	5
Size shots (in.)	½
Number of shots	24

PRODUCTION TEST

Time flowed (hr.)	24
Choke (in.)	¼
Tubing pressure (p.s.i.)	950
Casing pressure	(sealed)
Separator pressure (p.s.i.)	35
Oil (bbl.)	178
Water	(trace)
Gas (cu. ft.)	578,000
Gas-oil ratio	3,250:1
Gravity, A.P.I.	41.3

REFINING

Manpower Problem Critical in California Refineries

SAN FRANCISCO. — Manpower problems of the California refiner, regarded as well in hand last November, are again critical. Other branches of the oil industry face an increasingly serious situation. Estimates based on a recent survey indicate that 1,600 essential workers are needed in the San Francisco Bay area, and the number needed in southern California is placed at 2,000.

Total essential employment in the state's drilling, production, refining and transportation operations is about 45,000. This is less than the number of men needed in one of the big aircraft plants, but the tremendous demands for military and naval oil and aviation gasoline make these oil workers vital.

Various factors have combined to create the existing difficulties. One is that common labor fills a small percentage of essential oil jobs. It is calculated that under normal conditions not more than 30 out of 1,000 workers in a refinery are common laborers.

Recent occurrences have afforded examples of what may happen in a refinery as a result of inexperience. A $250,000 fire, and a 10-day complete shutdown in another plant were caused by bungling of workers. One large California refinery estimates a refining unit's capacity can be impaired 20 per cent for 6 months in the process of training a new operator.

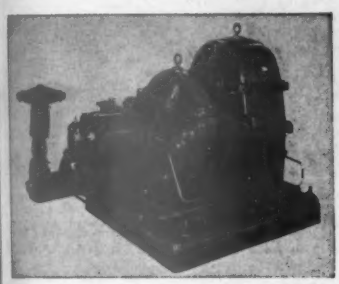
There is no reserve now of competent men for any essential division of the California oil industry. While men have begun to be released from other war work, they are not the type needed to train for responsible oil jobs under the seniority system.

Asphalt Institute Directors Elect Widger Chairman

NEW YORK—F. V. Widger, of The Texas Co., was elected chairman of the executive committee of The Asphalt Institute at the annual meeting of the board of directors. The institute represents the major part of the petroleum asphalt production industry in the United States and Canada. The other members of the committee are J. A. Blood, Standard Oil Co. of California; F. R. Field, Standard Oil Co. of New Jersey; A. M. Maxwell, Standard Oil Co. of Ohio; H. B. Pullar, Berry Asphalt Co.; D. D. Williamson, Talco Asphalt & Refining Division, Southport Petroleum Co. of Delaware; H. R. Pauley, The Petrol Corp.

Vice presidents elected, with their regional jurisdiction, are: Atlantic Seaboard-Southern, F. R. Field; Ohio-

MURRAY
STEAM TURBINES FOR
REFINERIES



Type UG integral geared turbine. Turbine is supported by the gear at turbine shaft center line, thereby avoiding misalignment due to heating of turbine casing. Available in sizes up to 750 H.P. Arrangement of constant or excess pressure governor is shown.

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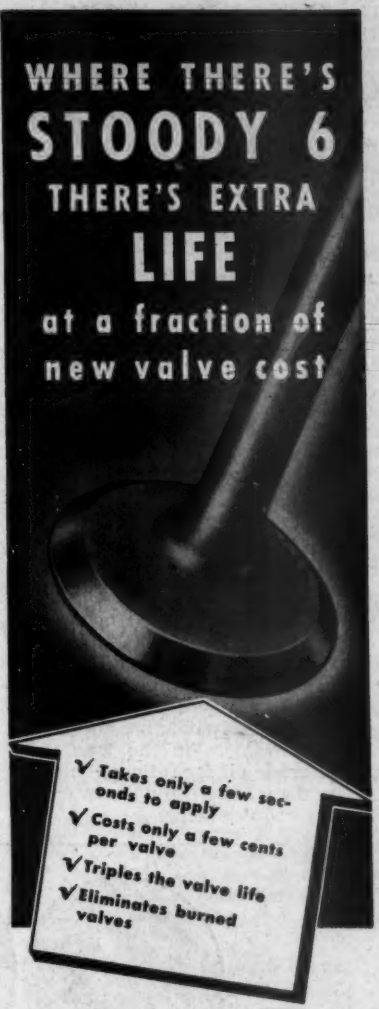
THERE'S EXTRA
LIFE
at a fraction of
new valve cost



THIS folder outlines the simple procedure any garage or shop equipped with acetylene welding equipment can follow. Eliminate your worries about valve replacements and save money as well. Write for folder "Weld New Life Onto Worn Valves With Stoody 6"—no obligation.

STOODY COMPANY
1138 SLAUSON AVE., WHITTIER, CALIF.

STOODY 6-THE METAL THAT ADDS EXTRA MILES TO EXHAUST VALVE LIFE!

Great Lakes, A. M. Maxwell; Midwest, H. B. Pullar; Gulf, D. D. Williamson; Pacific Coast, H. R. Pauley. Bernard E. Gray was reelected general manager-chief engineer and Herbert Spencer president. George R. Christie, Standard Oil of New York, was reelected secretary and treasurer, with John U. Smith, of the same company, continuing as assistant treasurer.

Asphalt-producing companies newly elected to membership by the board increased the total to 38, the largest number in the institute's history. The new members are The Derby Oil Co., Wichita, Kans.; Lion Oil Refining Co., El Dorado, Ark.; Skelly Oil Co., Tulsa.

Tonnage reported for heavy asphalt based on U. S. Bureau of Mines figures for 1943 was 1½ per cent above the previous record figure of 1943. Road oils were off, owing to war restriction.

Hopes for More Gasoline In Canada Dissipated

OTTAWA.—Hopes of Canadian motorists for early relaxation of restrictions on use of gasoline and oil have been dissipated by C. D. Howe, munitions minister, who announced that any improvement in the transportation of crude oil for refiners had been "more than offset" by the war's increasing requirements.

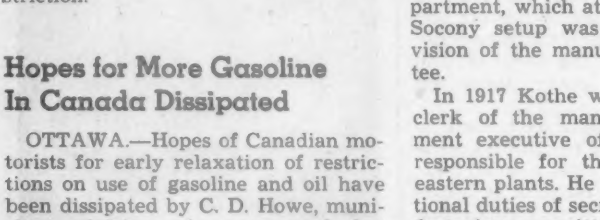
Sketches of Plant Operators

EDWARD N. KOTHE, member of the manufacturing committee of Socony-Vacuum Oil Co., Inc., couldn't very well have escaped being an oil man. He was born October 21, 1888, in Brooklyn on the site of the present Pratt Institute Library — and the Pratts are traditionally Standard Oil men.

For 37 years "Big Ed" has been identified with oil. In February 1907, he took his first job in the industry as a bookkeeper for Standard Oil Co. of New Jersey. Four years later he was transferred to Standard Oil Co. of New York as a statistician in the accounting department. In 1913 he was moved to the yield and cost department, which at that period in the Socony setup was under the supervision of the manufacturing committee.

In 1917 Kothe was appointed chief clerk of the manufacturing department executive offices, which were responsible for the operation of all eastern plants. He took over the additional duties of secretary to the manufacturing committee and assistant to the general manager of the manufacturing department in 1926. Five years later he was elected a vice president and director of Franklin Railway Oil Corp. in charge of manufacturing.

Socony-Vacuum named Kothe a member of the manufacturing committee, in charge of accounting for all refinery offices in 1932. An additional duty was supervision of distribution of all products from eastern refineries of the company.



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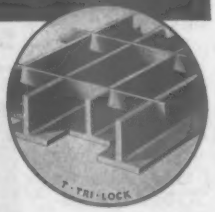
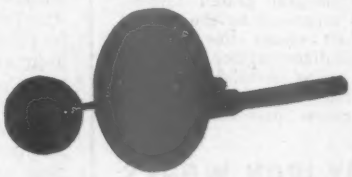
Full descriptive catalog of Tri-lok Grating, Safety Treads and other products on request.



DAVIS LIQUID LEVEL CONTROLS

with Dia-Ball packless transmission unit



The Davis Dia-Ball is an improved packless transmission unit for Liquid Level Controllers and Control Valves.

• **REPLACES** conventional outboard ball bearing packing box.

• **SAVES** time and maintenance nuisance for busy engineers. No leaky shaft or stem packing with which to contend; no packing box nuts that need be taken up.

No. 161D Packless Float Box and No. 66B Packless Control Valve.

• **PROTECTS** against danger of inflammable or volatile liquids leaking and causing fire or explosion.

• **IMPROVES** control operation through straight-lined power transmission, minimum of friction, and increased sensitivity. For pressures up to 300 p.s.i. and temperatures up to 300° F.

• **AVAILABLE** on Davis Liquid Level Controllers. Lever Operated and Solenoid valves.

For complete details write for literature.

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PIPE LINES

WEP Resumes Gasoline Shipments Through 20-In. Products Line

A batch of 345,000 bbl. of 80-octane gasoline is passing through the 20-in. products line of the War Emergency Pipelines, Inc., system. The remainder of the fluid in the line is No. 2 heating oil. With two units in operation at each station, a throughput close to 180,000 bbl. daily has been maintained. As a result of interruption, due to lightning last week, the throughput both of the crude oil and products lines was decreased somewhat on certain days.

Preparations are being made to start a batch of approximately 345,000 bbl. of 72-octane gasoline through the line on March 31. Schedules for April have not been definitely determined, but it is believed that during the month there will be some shipments of Navy diesel oil; 72-octane gasoline shipments are expected to be substituted for the scheduled kerosene movements.

W. Alton Jones, president, War Emergency Pipelines, Inc., delivered an address at dedication ceremonies for the big-inch and little big-inch lines at Rockwood, Pa., March 24. Rep. J. Buell Snyder and George A. Wilson, director of supply and transportation for PAW also spoke. In the program, oil from a bomber in the Tokio raid was poured in machinery of the 24-in. crude-oil line and gasoline from a bomber in the first American raid on Berlin was used for christening the 20-in. products line.

Williams Brothers Officials Receive Navy Award

The first Navy Department awards in the Canal Zone for outstanding civilian achievement in advancement of the war effort were announced by Rear Adm. Harold C. Train, U.S.N., Commandant 15th Naval District. The civilians, whose efforts were recognized are S. M. Williams, president; David R. Williams, vice president, and A. M. Garber, construction superintendent, Williams Brothers Corp. The recognition took the form of the Navy's Meritorious Civilian Service Award. Admiral Train, in announcing the award, commented to the effect that the problem of war construction is not so much the "know how" as the "will do" which produces results. Rear Adm. L. B. Combs (CEC), U.S.N., acting chief of the Bureau of Yards and Docks, added his congratulations and expression of appreciation of the accomplishment.

The particular project, on which not only the company award of the Navy "E" but also these specific citations were earned, remains part of a military secret. Disclosure cannot be made at this time regarding the features of the unusual engineering construction project in which many serious and unforeseen difficulties were encountered in jungles which had been regarded as unpenetrable and rugged mountainous terrain as well as by climatic and labor supply troubles.

Recommendations for the award were approved by the Navy Department, Board of Civilian Awards. The situation and award carries with it a small silver lapel button with distinctive insignia.

Stanolind Fills 16-In. West Texas Outlet

By 7 a.m., March 27, Stanolind Pipe Line Co. had pumped 295,000 bbl. of crude into the Slaughter, Tex.-Drumright, Okla., 16-in. line; 490,000 bbl. is required to fill the line. Pumping is being done by the Slaughter station alone operating at 325-lb. pressure. The line is to be completely filled March 31 and regular deliveries are to start April 1. During the first month it is not expected that the Bretch, Okla., station will be used, as the scheduled movement can be handled by the initial station. Contractors' work was finished March 15.

A loading rack is being built at Cushing, Okla., from which tank-car shipments will start May 1.

Texas-California Line Is Being Promoted

Efforts are being made to obtain government funds for construction of a 986-mile 20-in. crude-oil line from Monahans, Ward County, Texas, to Beaumont, Calif., to cost $47,000,000. For the project a private company has been formed known as Pacific War Emergency Pipelines, Inc., headed by Angus G. Wynne, president; J. C.

STOODY SELF-HARDENING MAKES THE DIFFERENCE!

ABOVE are two reclaimed rollers taken from the same tractor. The upper roller was rebuilt to size with high carbon electrodes alone, but the lower roller carried a protective layer of Stoody Self-Hardening over the high carbon build-up*.

Abrasive conditions encountered in tractor operation were so severe the top roller was worn out in three months' time. The Stoody Self-Hardening, however, kept the lower roller in operation for another three-months period, a life increase of 100%!

Cost of the Stoody Self-Hardening deposit can be ignored, considering benefits obtained and the time saved in eliminating an extra overhaul.

Hard-facing can be applied either of two ways: (1) A bead run around the outer edge and space between the bead and collar filled in with horizontal welds or (2) A bead around the outer edge to bring the roller back to diameter, and intervening area between outer edge and collar filled with a continuous spiral of hard metal. Either method is equally successful but the latter has the advantage of more easily maintaining roller concentricity.

Have you received your copy of Stoody Specification Sheets? They illustrate and describe dozens of equipment-saving applications thru the use of hard-facing—sent free on request.

*The preliminary high carbon build-up can be eliminated if Stoody Self-Hardening is applied before excessive wear has occurred on the roller.

STOODY COMPANY
1138 WEST SLAUSON, WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Stop wear . . . Eliminate Repair

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Modern Equipment
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COMPRESSORS DITCHERS DOZERS
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SMITH
CONTRACTING CO.
PIPE LINE CONSTRUCTION
ODESSA, TEXAS

Hawkins, vice president, and L. M. Glasco, Dallas, secretary-treasurer.

Support for the line also has come from Olin Culberson, Texas railroad commissioner, who was with project officials in Washington when they applied to the Petroleum Administration for War for priorities assistance.

Stanolind Authorized to Lay 12-In. In Wyoming

An amendment provides for use of 12-in. line instead of a combination 8-in. and 10-in. for Stanolind Pipe Line Co.'s 240-mile crude-oil line from Elk Basin to Casper, Wyo. Pipe is scheduled to arrive from the mill in May when construction will commence. Prospects for crude oil movements from Elk Basin have been adversely affected by recent declines in reservoir pressures requiring revision of production programs.

Construction of Gulf Loops to Start Soon

Clearing of right-of-way has begun for Gulf Refining Co.'s 88 miles of 8-in. and 10-in. loops on its West Texas outlet and 27-mile 8-in. extension from Big Sandy to Longview, Tex. Sharman and Allen, contractors, are reported to be waiting for pipe to arrive from the mill. The project is scheduled for completion in June or July.

Sheriff Protects Tennessee Line Contractor's Men

ASHLAND, Ky. — Representatives of Bechtel-Dempsey-Price were conferring with labor union officials at Lexington, Ky., early this week regarding "peaceful picketing" at Burnaugh, Ky., 8 miles from Catlettsburg where attempts were made to interfere with unloading of material for construction of Tennessee Gas & Transmission Co.'s Corpus Christi, Tex.-Charleston, W. Va., natural-gas line. Protection has been given to the contractor's men by Sheriff T. P. Ross and deputies.

Larger Pipe-Line Runs Planned for Venezuela

Mene Grande Oil Co. is building a booster station at Anaco, in eastern Venezuela to pump crude oil from the greater San Joaquin producing area into the company's 16-in. line from Oficina to Puerto la Cruz. At the Anoco pump station, 40 miles from Oficina, four 80,000-bbl. tanks are being built. The plan is to shut down pumps at Oficina while the Anoco station is pumping into the line.

A subsidiary of Socony-Vacuum Oil Co., C.A., has had 60 miles of 8-in. pipe stacked at Puerto la Cruz for several months for construction of a line to the greater San Joaquin area. This has not been undertaken because of arrangements reported to have been made for transporting through the Mene Grande system after it becomes a common carrier about April 1, after which the company will conform with conversion requirements presented by law as one of the bases on which oil properties are to be operated in Venezuela.

Sociedad Anonima Petrolera Las Mercedes, partially owned subsidiary of Texas Petroleum Co., with 4,000 bbl. daily potential production in the Las Mercedes field is drilling the area with the expectation of building a pipe-line outlet if sufficient production is obtained.

The road contracted for construction preparatory to the possible laying of a 16-in. pipe line from the Jusepin-Mulata area by Creole Petroleum Co. and Mene Grande Oil Co., is to traverse a route from Jusepin to San Mateo where it will join the Puerto la Cruz-Oficina highway of Mene Grande Oil Co.

A new 1,050-ft. 8-in. submarine pipe line has been under construction at Catia de la Mar, Venezuela, by Caribbean Petroleum Co. to replace the old line built several years ago. This line is for unloading to storage tanks ashore the supplies of gasoline, kerosene and fuel oil from tankers entering a nearby port. These products are then pumped through another pipe line to Boqueron where they are loaded into tank cars and trucks for distribution in the Caracas area.

Yale Prepares for Laying Elk Basin-Billings Line

Right-of-way is being acquired and material assembled, preparatory to starting construction operations as soon as weather conditions permit on Yale Oil Pipe Line Co.'s 82 miles of 6-in. and 8-in. pipe, connecting the Elk Basin, Wyoming, field with refineries at Laurel and Billings, Mont.

C. S. FOREMAN COMPANY
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PIPE LINES
20 West Ninth Street
Kansas City, Missouri

Natural Gas

Butane Plants to Supplement Dwindling Supply of Gas

CENTRALIA, Ill.—Two butane-gas storage and mixing plants are to be installed by Illinois Power Co., one at Centralia and one at Mount Vernon, to supplement the dwindling supply of natural gas. "Choice of equipment," said C. A. Steinhauser, southern division manager, "has been influenced largely by the company's desire to continue furnishing a gas of high heat content that will burn satisfactorily without readjustment of appliance burners."

The company's action follows a critical shortage of natural gas last November.

Billion Ft. of Gas Wasted Daily, Commission Says

AUSTIN.—About 1 billion cubic feet of natural gas is wasted each day in Texas, according to figures compiled by the Oil and Gas Division of the state Railroad Commission. In fuel value this is equivalent to some 166,667 bbl. of crude oil. Commission reports indicate that this vast volume of casinghead gas, produced with oil, is burned every 24 hours because there seems to be no other way to dispose of it. Texas produces approximately 2,000,000 bbl. of oil daily, and with it 2,639,614,000 cu. ft. of casinghead gas.

Of this total, 1,650,998,000 cu. ft. is moved to plants for extraction of natural gasoline, for gas lifting on oil wells, for repressuring oil fields, for domestic fuel or other useful purposes. That leaves 988,616,000 cu. ft. to be burned.

"Finding a useful outlet for this gas is perhaps the biggest conservation problem facing the petroleum industry," Beauford H. Jester, chairman of the commission, said. "The Interstate Compact Commission, state regulatory bodies, colleges and private companies all are seeking a solution."

Engineers generally regard 6,000 cu. ft. of natural gas as equal to 1 bbl. of crude oil in terms of gasoline content, but the expense of converting gas into gasoline has been too great to compete with the gasoline made from oil.

The research committee of the Interstate Oil Compact Commission is trying to encourage location of gasoline plants using the Fischer-Tropsch method in casinghead gas areas. This method is among the most efficient for making gasoline from natural gas.

Research on the problem also is being conducted at University of Texas and elsewhere.

The commission said 100,000,000 cu. ft. of casinghead gas is being wasted in the Rodessa field of Northeast Texas; 25,000,000 in the Saxet field, South Texas; 44,000,000 in Wasson field, and 55,000,000 in Goldsmith field, both in West Texas.

Panhandle Eastern Hearing Postponed by Commission

WASHINGTON—The hearing set for March 24 on application filed by Panhandle Eastern Pipe Line Co., Kansas City, Mo., for permission to construct and operate two short natural-gas pipe lines in Michigan has been postponed to April 19 by Federal Power Commission.

Natural-Gas Production in Alberta Shows Increase

CHATHAM, Ont.—Production of natural gas in all Alberta fields in January was 5,524,476,000 or 178,209,000 daily, an increase of 10,633,000 daily over December but a decrease of 14,388,000 from January 1943. Production from the various fields in January was: Turner Valley, 4,063,127,000; Foremost, 5,184,000; Viking, 314,866,000; Kinsella, 617,240,000; Medicine Hat, 371,044,000; Redcliff, 62,864,000; other fields, 90,151,000. Turner Valley wastage in January totaled 1,540,394,000.

Frank S. Kelly New Head of Southern Gas Association

NEW ORLEANS.—Frank S. Kelly, Jr., industrial engineer for Arkansas Louisiana Gas Co., Shreveport, was elected president of Southern Gas Association at its 2-day wartime session here last week. Other officers chosen are: First vice president, Clayton L. Nairne, New Orleans Public Service, Inc.; second vice president, John H. Worden, Oklahoma Natural Gas Co., Tulsa; secretary, L. L. Baxter, Arkansas Western Gas Co., Fayetteville.

The keynote of the meeting was "Gas, Its War Task and Postwar Responsibilities." The entire session was devoted to subjects dealing with conversion of the gas industry from wartime to peacetime economy, absorption of former employes now in the armed forces after hostilities cease, maintenance and construction work that will be pursued when normal times return.

Production of home units for deep-freeze refrigeration by natural gas will be a development of the postwar period, Dean Strickland, of United Gas Corp., Houston, told the conference.

"Because gas is cheap, clean and dependable, it is the natural energy to be employed in home improvement and work-saving devices for the postwar world," Strickland said. He added that with the deep-freeze unit persons will be able to buy fruits and vegetables and freeze them for out-of-season use.

The conference attracted more than 600 members, who represented between 35 and 40 gas companies in the 13 states which comprise the association. The association was originally founded in the interest of members of the manufactured gas industry. It was later expanded to include most of the states in the southwest. It is an affiliate of American Gas Association.

Proration Order for Huge Hugoton Field Promised

TOPEKA.—Following a hearing before Kansas Corporation Commission in Wichita, T. A. Morgan, conservation director, said proration for the Hugoton gas field probably would be announced this week.

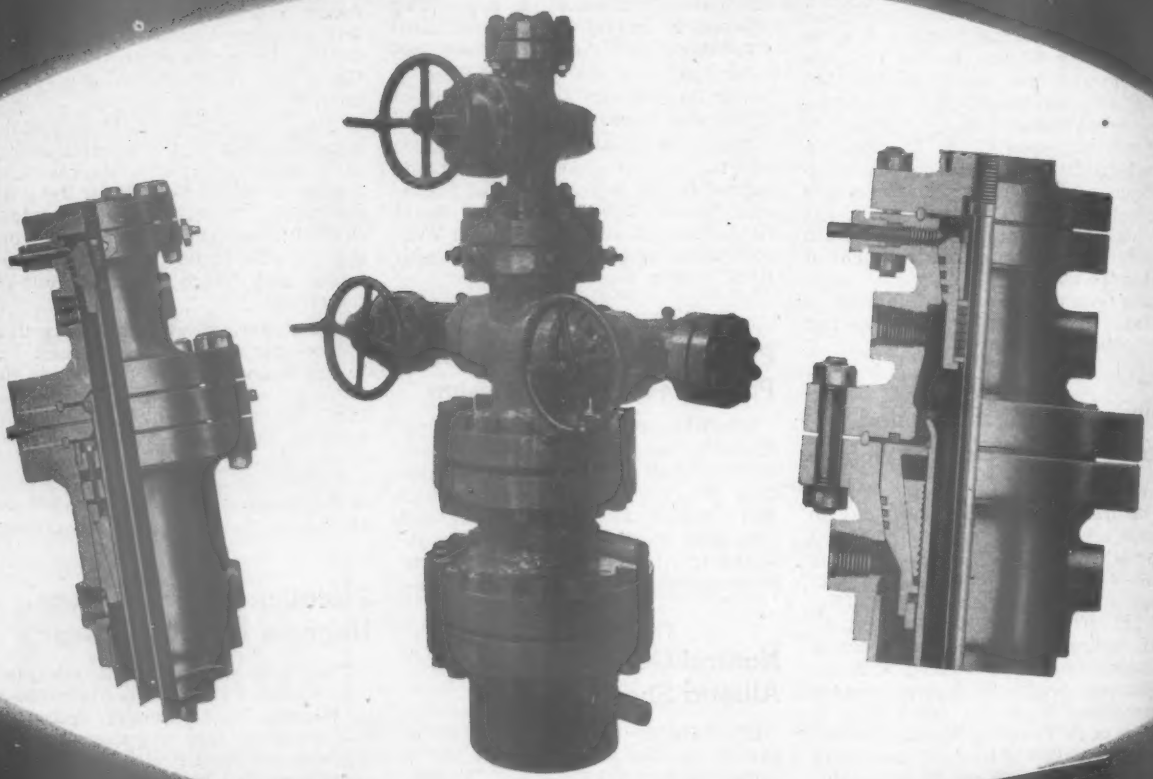
The Hugoton field, largest in the world, has an estimated reserve of 12½ trillion cu. ft. of gas. About 65 per cent of the field lies in Kansas and the rest in Oklahoma. Eventual production is expected to be about 500,000,000 to 750,000,000 cu. ft. daily.

Currently the field is producing about 140,000,000 cu. ft. of gas daily. Richard McEntire, commission attorney, said that when production figures were set the output was expected to approximate 200,000,000 cu. ft. daily.

Cities Service interests have begun moving gas from the Guymon, Okla., section of the field, following completion of a 26-in. line from near Guymon to Blackwell, Okla. It has nominated 140,000,000 cu. ft. of gas a day for March and April.

Oklahoma and Kansas basic proration orders were issued last year and some phases of the orders have been enforced since that time.

DREADNAUGHT *Well Head and Christmas Tree Assemblies*



Type "HRP-25" Assembly 4000-6000 Lbs. Test

Type "HZX" Assembly 4000-6000 Lbs. Test

Type "HZR" Assembly 4000-6000 Lbs. Test

Pictured above are three of the most popular DREADNAUGHT Well Head Assemblies: The Type "HRP-25" Assembly which features a slip type casing head with resilient seal below the slips and a welded seal above. Provision is made in the welding flange for testing the welded seal. The threaded type tubing hanger is held in sealing position by means of locking screws in the top flange of the tubing head. The Type "HZX" Assembly consists of Type "HZ" Casing Heads with threaded hanger type suspension for casing strings. The tubing head section is the same as illustrated in the Type "HRP-25" Assembly except that it is provided with flanged outlets. The Type "HZR" Assembly provides slip type suspension with seal weld for casing strings, and threaded suspension for tubing string, with polish nipple hanger. The tubing head section is available threaded male or female or for flanged connection to valve.

The complete line of DREADNAUGHT Well Heads and Assemblies is described and illustrated in the Composite Catalog. Additional mechanical data will be gladly sent on request.

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Exploration and Drilling

Week's Highlights

RADAR, the magic weapon of this war, offers no hope to the oil men seeking some new and positive instrument to locate oil fields. Nor, so far as the geophysicists are concerned, does there seem to be any other magic instrument for finding oil fields available among the secret war weapons of the scientists. The geophysicists settled that question at their annual meeting in Dallas last week.

The oil industry's scientific exploration team sums up its problem as follows:

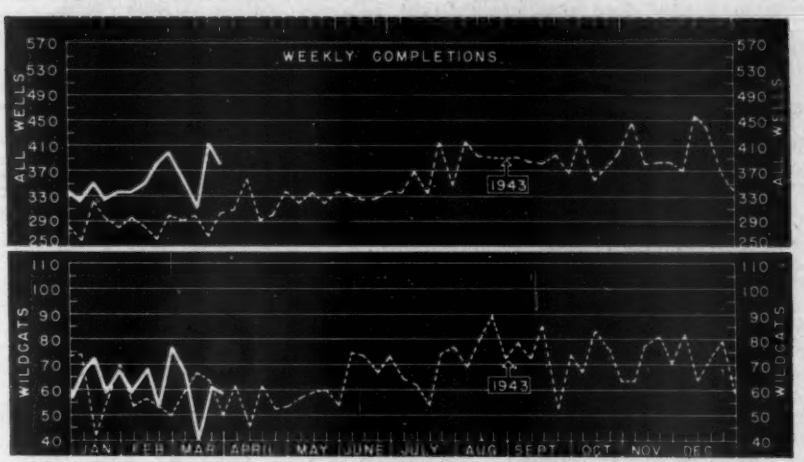
1. Up until 1937 their methods had found oil fields entirely too rapidly for the economic comfort of the industry. When the trend reversed about 1937, there was such a surplus of potential production that even the war demands did not worry the industry or the Government until some time in 1942.

2. From the outbreak of war until the past few months, men, money, materials and time have been poured forth in prodigious quantities both by industry and Government in the fields of transportation and refining; not only in construction but also in research.

3. During that same period, the exploration branch was neglected, deprived of materials, and raided for manpower both by Government and military forces.

4. After all this neglect, they are suddenly expected to pull rabbits out of a hat, while at the same time the Government makes a final raid on their sorely depleted manpower.

The industry's scientific exploration team says it cannot expect to pull rabbits out of a hat; science doesn't work that way. The scientists do hope for some assistance from industry and from Government, and if given that assistance they expect to produce substantial results. From industry they want more liberal budgets to support more research and a willingness by management to take more risks in drilling wildcats on less positive interpretation of available geological and geophysical information. From Government they want a more intelligent understanding of their manpower needs and their material requirements. They can't see any sense in wrecking oil exploration prospects for the sake of turning a few hundred technically trained scientists into buck privates.



Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

(Week ended March 25, 1944)

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1944	1943
N. Y., Penna., Ohio	51	19	2	72	141,976	786	688
Ohio	0	8	9	17	46,135	212	203
Indiana	4	0	1	5	10,995	55	63
Kentucky	8	2	0	10	17,417	132	61
Illinois	12	0	10	22	51,168	373	420
Michigan	4	1	5	10	32,610	117	94
Kansas	14	4	24	42	114,707	384	300
Nebraska	0	0	0	0	0	8	6
Missouri-Iowa	0	0	0	0	0	4	3
Oklahoma	17	1	17	35	104,881	339	254
Texas:							
North Central Texas	17	0	12	29	66,642	296	259
West Texas	24	0	2	26	119,242	315	195
Texas Panhandle	3	0	0	3	8,861	31	43
Eastern Texas	1	0	9	10	42,934	73	58
Texas Gulf Coast	14	1	2	17	112,269	131	86
Southwest Texas	3	0	3	6	28,177	212	191
Total Texas	62	1	28	91	378,125	1,058	832
Louisiana:							
North Louisiana	1	1	4	6	34,748	58	67
Louisiana Gulf Coast	4	0	1	5	45,126	93	78
Total Louisiana	5	1	5	11	79,874	151	145
Arkansas	1	0	3	4	23,446	50	51
Mississippi and Southeast	1	0	3	4	17,134	32	11
Montana	4	0	1	5	11,161	50	36
Wyoming	1	0	0	1	4,485	31	26
Colorado-Utah	0	0	1	1	2,622	9	3
New Mexico	9	0	0	9	26,545	95	49
California	38	0	3	41	141,419	414	231
Total United States	231	37	112	380	1,204,700	4,280	3,476
Total previous week	245	24	145	414			
Week ended Mar. 27, 1943	177	36	91	304			

CALIFORNIA

New Deep Zone Is Tapped In Buena Vista Hills

LOS ANGELES.—Standard Oil Co. of California has completed 54-27-B at Buena Vista Hills, flowing 624 bbl. of clean 25.5-gravity oil daily from a new deep zone of probable Miocene age. Drilled to 4,645 ft., the well was plugged back to 4,440 ft. A string of 6⅝-in. casing was cemented at 4,360 ft. so that the well is producing from 80 ft. of formation. Location already has been staked for a second well.

The new producer is on the south flank of the United anticline and the potentially productive acreage involved includes at least 2,500 acres. Of three highs on the Buena Vista Hills anticline one has been found unproductive, one productive and one remains to be tested. Standard's well is about 6 miles northwest of Honolulu Oil Corp.'s deep test which was abandoned several years ago as far as the lower zones are concerned.

Prior to Honolulu's deep test, operators of the entire field had agreed to a unit plan of development as the productive area approximates 15,000 acres. Honolulu's dry hole in 10-32s-24e eliminated about 10,000 acres as potentially productive below present production.

Edwin and Harold Pauley have not been able to make a production test of their wildcat on the Hyperion sewer farm in the El Segundo district of Los Angeles Basin, but should have pumping equipment ready for use within another week or so. A flowing well had been expected but it failed to kick over after several days of swabbing and bailing operations. The delay in putting this well on production reflects the shortage of equipment, notwithstanding assertions there is plenty of material available in California.

Standard Oil Co. of California is preparing to start a new wildcat in the Rosecrans district of Los Angeles Basin to determine the possibility of a fault trap.

CALIFORNIA WILDCAT COMPLETIONS

Whittier district, Los Angeles County: C.C.M.O. Co. 4-1 Community, 2-3s-11w, abandoned in barren gray sand at 6,133 ft., only minor showings logged.

Dinuba district, Tulare County: Amerada 20-1 Community, 20-16s-14e, abandoned in basement granite at 1,231 ft., no showings logged.

MICHIGAN

Week's Report Shows Four Producers, Five Dry Holes

SAGINAW. — Ten completions in Michigan fields during the past week comprised five dry holes, four oil wells and a small gas well, the last named in the Norwich area of Newaygo County. Three of the dry holes were wildcats. One of the producers was a small wildcat in Larkin Township, Midland County.

Statistics compiled by Michigan Oil and Gas Association for February show an upward trend in Michigan production. The daily output was 52,412 bbl., a gain of 2,500 bbl. over January for a month's total of 1,519,948 bbl. Most of the increase was due to recent developments in the Goodwell field of Newaygo County, where the daily average increased to 2,042 bbl., compared with 966 in January. Production in Fork-Mecosta average 4,167 bbl., up 350 bbl. over January. Increases of 100 to 150 bbl. a day were recorded in Adams-Arenac, Ogemaw County, and the Vernon-Leaton-Denver areas. Rose Lake was up 350 bbl. to 1,942. The sharp decline of the Reed City field, principal producing area, was halted, the average being 15,203 bbl., only 160 bbl. under the January figure.

Three of the five dry holes among the 10 completions were wildcat tests. Among the four producers was a small wildcat well developed in Larkin Township, Midland County. A small gas well also was drilled in Norwich of Newaygo County.

MICHIGAN WILDCAT COMPLETIONS

Clinton County, Lebanon Township: J. E. Hood 1 Jess Guernsey, NE SW NE 19-8n-4w, dry at 3,226 ft.

Iosco County, Au Sable Township: Ervin Major 1 T. H. Welch, SE SW SW 33-23n-9e, dry at 2,662 ft.

Midland County, Larkin Township: Sun Oil Co. 1 J. Zuchowski, C S½ SW SE 21-15n-2e, pumping 6 bbl. weekly, TD 3,829 ft., PB 2,449 ft.

Van Buren County, Arlington Township: W. H. Clock 1 Edwards, NE SE NE 18-2s-15w, dry at 1,073 ft.

APPALACHIAN FIELDS

Cabot Test May Confirm Pool in Wood County

PITTSBURGH.—Godfrey L. Cabot, Inc., has started drilling a test on the P. A. Cline farm in Williams district, Wood County, West Virginia, ½ mile southwest of the large gas well on the Joanna Drake farm. It will be an important check on a possible new pool. In Calhoun County Gerald Jones et al completed a gas well in the Squaw sand as a test on the Michael Wallbrown farm in Washington district. It gages 4,559,000 cu. ft. from a total depth of 2,328 ft.

In Raleigh County, West Virginia, Godfrey L. Cabot, Inc., reached 6,110 ft. in the Oriskany test on the C. E. Gwinn farm in Richmond district and has a fishing job, having lost the tools owing to a gas pocket while drilling in black shale. In Tucker County the rotary test of Ohio Oil Co., on the Blackwater anticline in Dry Fork district, made only a few feet of hole during the week with the tools now down to 7,894 ft. The formation appears to be a very hard chert stringer, almost impervious to the rock bit.

In Butler County, Pennsylvania, Manufacturers Light & Heat Co. is rigging up to run 7-in. casing to bot-

DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 25 crude oil	Distillate, allied products	Mar. PAW quota all oils	Mar. 18 crude oil
Arkansas	79,600	5,000	81,700	79,700
California	829,850	47,200	880,600	827,750
Colorado	7,850	.....	7,000	7,640
Eastern	72,300	8,900	81,100	71,800
Illinois	216,100	13,000	228,000	206,809
Indiana	12,000	.....	13,600	13,650
Kansas	274,100	6,000	291,000	284,150
Kentucky	19,600	2,800	26,800	24,100
Louisiana	360,100	23,000	375,700	360,150
North Louisiana	76,100	.....	.....	76,200
Louisiana Gulf	284,000	.....	.....	283,950
Michigan	50,950	300	52,300	53,750
Mississippi	41,500	.....	46,000	38,700
Montana	23,300	300	24,300	23,859
Nebraska	1,350	.....	1,000	1,300
New Mexico	112,800	4,900	116,600	112,550
Oklahoma	329,500	27,000	355,000	329,400
Texas	1,863,450	127,000	1,965,000	1,863,450
East Texas	365,300	.....	.....	365,400
West Texas	340,700	.....	.....	340,600
North Central Texas	142,650	.....	.....	142,700
East Central Texas	116,550	.....	.....	116,500
Texas Panhandle	92,850	.....	.....	92,850
Texas Gulf	710,750	.....	.....	710,750
Southwest Texas	94,650	.....	.....	94,650
Wyoming	92,500	7,200	100,200	90,830
Total United States	4,386,550	277,000	4,645,900	4,391,588

Total production January 1-March 25, 1944 ..... 373,487,551 bbl.
Same period last year ..... 325,488,485 bbl.

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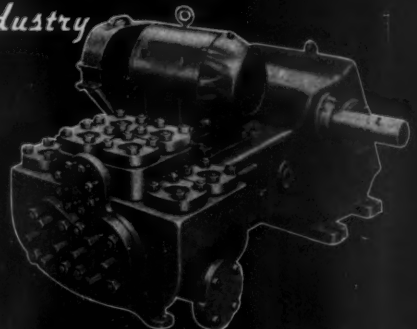

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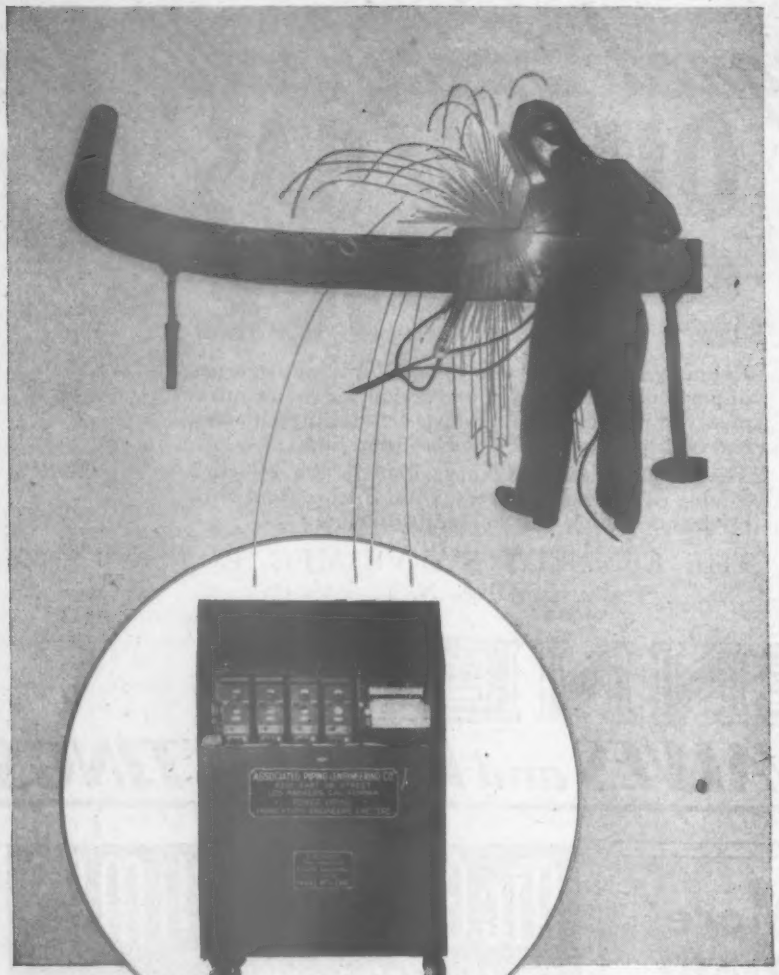

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tom in the deep test on the J. G. Hockenberry farm, which reached the Queenston red shale at 6,680 ft. It will be deepened to the Trenton. The test is in Mercer Township, 2 miles west of Forestville.

EASTERN TEXAS

Franklin County Wildcat Tops Smackover Lime

DALLAS.—Humble Oil & Refining 1 J. F. Hogue, Humphries Survey, 1 mile southwest of Winfield, on the Franklin-Titus County line, topped Smackover lime at 11,239 ft. and recovered a 15-ft. core with sulfur odor at 11,284-11,304 ft. After a drill-stem test which showed water, the test was drilling below 11,406 ft. This is one of the deepest holes ever drilled in East Texas.

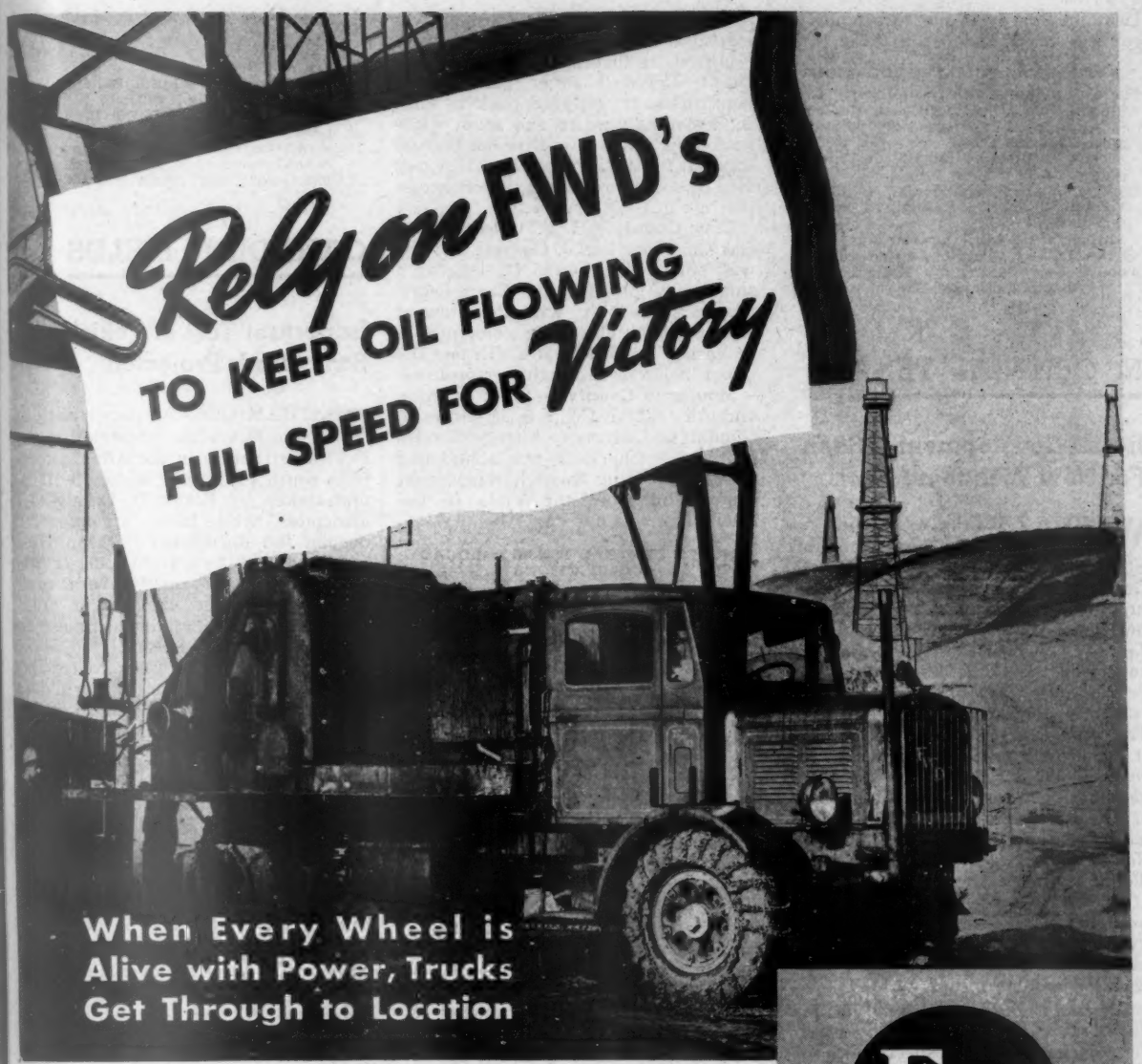
Limestone County. — Failure for W. J. Gourley and George Fagg 1 Barron, southeast of Groesbeck in SA &MG Survey 538 appeared likely when the wildcat showed salt water in both the Pettit and Travis Peak horizons on an electric survey. Porous zone in the Pettit was logged at 5,801 ft., and Travis Peak was topped at 5,899 ft.

Smith County. — Bobby Manziel 1 Morrison, S. J. Lott Survey, a deep test, topped the Paluxy sand at 5,366 ft., with some porosity at 5,531 ft. Glen Rose was topped at 5,707 ft., but no shows were reported, and the test was coring ahead. In the Sand Flat pool, Sun Oil 1 Mrs. Alice Patterson, west offset, total depth 9,418 ft., with 5½-in. casing cemented at 9,412 ft., perforated 102 shots at 9,350-67 ft., and made a swabbing test, recovering light-green oil with gas and brackish water.

Panola County.—Another gas well for the Carthage field was indicated at Rogers Lacy 4 Burnett Brothers, Hendricks Survey, which perforated casing opposite the Travis Peak horizon and started making gas and distillate. The operator plans to acidize the formation. A new deep wildcat for the western part of the county is Southport Petroleum 1 A. R. Scharnagel, 500 ft. from south, 1,500 ft. from west, of 200-acre tract and Catherine Lindsey Survey.

Rusk County. — Sinclair Prairie Oil Co. 1 F. H. Markey, Robert Merritt Survey, 6 miles south by west of Tatum, logged porosity at 6,919 ft., but the bottom part was broken, and the test was being drilled deeper. The Texas Co. staked 1 Harris Turlington, wildcat test 2 miles north of Tatum.

Wood County.—A new producer for the Manziel pool is Magnolia Petroleum Co. 1 Herring, Burch Survey, completed for 368 bbl. through ¼-in. choke. The company's 1 Lindley, Mc-



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Dannald Survey in northwest part of county, was abandoned at 8,632 ft.

EAST TEXAS WILDCAT LOCATIONS

Cherokee County: American Liberty Oil 1 Cobb-Holman Lumber Co., J. M. George Sur., 2 mi. S of Ironton, dry at 4,920 ft.
Sabine County: Delta Drlg. Co. et al 1 Thos. E. Ridge, 2 mi. SW of Pineland, dry at 8,016 ft.
Trinity County: Continental 1 Houston County Lumber Co., 4 mi. N Centralia, dry at 4,841 ft.
Navarro Oil 1 Wm. Cameron Lumber Co., 5 mi. SW of Groveton, dry at 6,050 ft.
Wood County: Magnolia 1 Katie M. Lindsey, Sarah McDonald Sur., dry at 8,634 ft.

N. CENTRAL TEXAS

Rapid Development Is Seen For New Woodbine Pool

WICHITA FALLS, Tex.—Rapid development for the new Woodbine Strawn sand pool in eastern Cooke County is seen, with the second well now in the pay zone, testing different horizons. Northern Ordnance, Inc. 1 Lindsey, northeast offset to the discovery in the G. de Los Santos Survey, 1 mile east of Woodbine, has run three drill-stem tests showing oil. The first, 4,107-16 ft., recovered 1,096 ft. of oil. Another, at 4,357-66 ft., recovered 300 ft. Results of the third have not been reported. A slight show of oil was cored at 4,360-70 ft. Two more locations have been staked by Northern Ordnance. One mile west of Woodbine C. Andrade III has staked a wildcat, 1 J. L. Newman, 660 ft. from north and east of C. Collingsworth Survey, to explore the same pay horizon. It is about 2 miles west of the Woodbine discovery.

Grayson County.—Drilling was resumed at Sinclair Prairie 1 George Fischer, new pool prospect south of Whitesboro in J. Shelton Survey, and the latest reported depth was 5,765 ft.

Archer County.—A. R. Dillard 1 H. H. Herndon, 7 miles south of Mankins in SPRR Survey, Block 1, had a show of oil in Caddo lime at 4,955 ft. Another show was logged at 4,997-5,050 ft. Top of the Mississippi was logged at 5,232 ft., but no shows were reported in drilling ahead. Bridwell Oil 1 Bridwell River ranch, total depth 6,038 ft., plugged back to 4,794 ft., tested salt water and scum while swabbing. The company has staked location for 2 River ranch, which will also be a 6,000-ft. test, but falls across the line in Clay County.

Clay County.—H. F. Wilcox Oil & Gas Co. 1 Scaling, J. Gamble Survey, was bottomed at 6,165 ft., logging a small show of oil in the Ellenburger, topped at 6,037 ft., with the show at 6,060-6,156 ft. Operators cemented 7-in. casing at 5,650 ft. and will test the upper horizons through perforations.

Montague County.—S. D. Johnson and Alco Valve Co. 1 S. D. Howard, Guadalupe University Survey, 5 miles south of Belcherville, was abandoned after perforating three horizons that showed oil from the Viola to the Ellenburger.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Archer County: The Texas Co. 1 A. B. Edwards, Sec. 32, Lula P. Hunt Sur., dry at 1,620 ft.

WEST CENTRAL TEXAS

ABILENE.—Ellenburger production has been discovered in the area southeast of the old Ibex pool and northwest of the Loving Caddo lime pool of western Stephens County at Phillips Petroleum Co. 1 Laura Wild, Section 58, Blind Asylum land. This well registered a flow of 83 bbl. in 3 hours through 5/64-in. choke on tubing, with 600 lb. casing pressure and 700 lb. tubing pressure. The wildcat entered dolomitic pay showing oil at 4,360 ft. and drilled to total depth of 4,375 ft. Elevation is 1,367 ft. North, east and west offsets have been staked.

In Coleman County, Franchot & Ball 1 Michie, 4 miles north of Echo, was estimated good for 50 bbl. oil per day from the Ranger lime, and an east offset was to be started immediately. The discovery well topped the Caddo at 2,754 ft., elevation 1,688.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Callahan County: H. G. Daniels 1 J. L. Dugan, Sec. 7, SP Ry. Sur., dry at 1,800 ft.
T. S. Stanfield 1 J. A. Harper, Sec. 23, dry at TD 546 ft.
Coleman County: Phillips 1 Ballard, D. W. Cloud Sur., dry at 3,722 ft.
Jones County: Merry Bros. & Perini et al 1 Wm. B. Agnew, Sec. 44, dry at 3,197 ft.
Throckmorton County: Bruce Sullivan and Auto-Ordnance 1 R. D. Bailes, Sec. 2168, TE&L Sur., dry at 5,254 ft.

CANADIAN FIELDS

Important Test of Pekisko Structure Is Projected

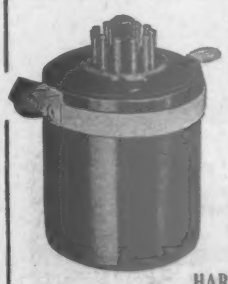
CHATHAM, Ont.—An important test of the Devonian limestone on the Pekisko structure in the Alberta foothills south of Turner Valley will be undertaken by Frank D. Lundy and associates who have arranged to deepen the unfinished Pekisko Hills 1, LSD 6, 6-17-2w5, from 4,400 ft. The well, a joint operation by several companies, suspended drilling in 1936 after getting the Madison limestone at 1,065 ft. and the Banff shales at 3,600 ft. Derrick has been erected and drilling likely will start in April. The location is about 6 miles south and a little west of the southernmost Turner Valley producer.

Hutton.—In the outlying Hutton area of the former Steveville field, in the south central plains area of Alberta, Riley Lloyd 1, LSD 16, 5-23-14w4, is coring below 3,643 ft. after getting the Madison, with good shows of water-free oil and gas at 3,385 ft. The test probably will be deepened into the Devonian limestone.

Pinhorn.—A third Devonian test in southern Alberta is McColl-Frontenac 1, LSD 6, 8-1-8w4, on the Pinhorn dome near the Montana boundary, which is in the Devonian below 4,387 ft. after getting substantial gas production in the Madison.

Wildcat Hills.—With prospects of establishing a new depth decord for Canada, Imperial-Wildcat Hills 1, LSD 16, 30-27-5w5, in the foothills west of Calgary, is in lower Blairmore below

Geophysical Transformers



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10,826 ft. and nearing the Dalhousie sand.

ILLINOIS

Few Completions and Small Average Initial Output

CENTRALIA, Ill. — Only 22 wells were completed in Illinois in the past week. Twelve were oil wells, with an aggregate initial production of 917 bbl., an average of 76.4 bbl. per well. Ten wells were dry.

Only two wells produced more than 100 bbl. initially. The best new well was completed in the Wayne County side of the Clay City Consolidated field, Pure Oil Co. 1 A. W. Powers, NW NE SE 34-2n-7e. McClosky lime was penetrated at 3,061-74 ft. The well swabbed and flowed 291 bbl. in 17 hours. In the first 24 hours on the pump it produced 306 bbl. The formation was not acidized.

Northern Ordnance Co. is making a deep-formation test of an old temporarily abandoned well in Hardin County drilled by Marietta Oil Co. in 1936. It had Devonian lime at 100 ft., Silurian at 1,484 ft., Maquoketa at 1,775 ft. and was bottomed at 2,345 ft. The new operators were last reported drilling at 2,530 ft. with the hole full of water.

A wildcat in southwestern Montgomery County, George Cassen 1 Keune, NE NW NW 32-8n-5w, tested Pennsylvanian sand at 611-30 ft. and bailed 12 bbl. of oil in 18 hours while cleaning out after a shot.

ILLINOIS WILDCAT COMPLETIONS

Clay County: Texas 1 C. E. Richards, SE NE NW 17-5n-7e, dry at 2,972 ft. Glen Dean 2,313 ft., Weiler 2,540 ft., Benoist 2,658 ft., Aux Vases 2,730 ft., Ste. Genevieve 2,786 ft., McClosky 2,873 ft., St. Louis 2,950 ft.

Dee Miller 1 C. A. Dunnigan, C W½ NW NW 14-3n-6e, dry at 3,081 ft., Menard 2,226 ft., Benoist 2,804 ft., Aux Vases 2,873 ft., Ste. Genevieve 2,942 ft., McClosky 3,000-04 ft. and 3,048-54 ft.

Ford County: D. K. Ross 1 Reynolds, 300 ft. from N and 100 from W lines NW SW 31-23n-8e, dry at 318 ft. Devonian 211 ft., Cedar Valley 216 ft., Silurian 222 ft.

Lawrence County: Central Pipe Line and Mohawk 1 Schick, C SW SW 7-2n-13w, dry at 3,060 ft., Menard 2,212 ft., Cypress 2,718 ft., Benoist sand 2,791 ft., Aux Vases 2,900 ft., McClosky 2,972-85 ft., water.

Richland County: Sun 1 Wright, NW NW SE 25-2n-14w, dry at 2,997 ft., McClosky lime 2,927-34 ft.

LEGAL

Notice of Oil & Gas Lease sale: The U.S. Department of Agriculture will award leases on 15 tracts of approximately 2,480 acres each in Cochran County, Texas, on former Slaughter Ranch. Rent $1.00 per acre. Awards limited to 1 tract per lessee. Sealed bids to be publicly opened April 17. Bid forms and additional information can be secured from Ray E. Davis, Acting Regional Director, Farm Security Administration, Old Post Office Building, Amarillo, Texas.

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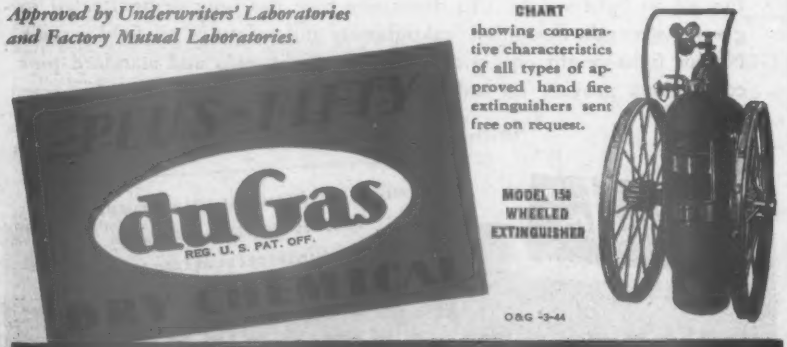

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TEXAS GULF COAST

Second Producer in Sight For Smith Point Field

HOUSTON. — The new Smith Point field, offshore from Chambers County, in Galveston Bay, was scheduled to receive its second producer as Standard Oil Co. of Texas prepared to test 2-109 State. Gas sand in the upper section of the Marginulina-Frio section was cored at 8,035-36 ft., and oil sand at 8,123-49 ft. Total depth is 7,177 ft., and 7-in. casing was cemented at 8,169 ft., following an electrical survey. This test is approximately 1,300 ft. northeast of the discovery well.

Jack Frazier-Cities Service Oil Co. 1 Gay, a Wilcox test near Columbus, Colorado County, is flowing from two sands in the Wilcox zone. On an initial gage it flowed 35 bbl. of oil and 560,000 cu. ft. of gas from perforations at 7,667-70 ft. and 2,350,000 cu. ft. of gas and 69.6 bbl. of distillate from perforations at 7,302-14 ft. This is the second Wilcox discovery made in the county within recent weeks, stimulating the already active play along this trend.

Operators interested in the Wilcox play were watching the progress of four advanced tests, three of which are in proven fields. Humble 7 Granbury & Smith, a projected 10,000-ft. test in the Livingston field, Polk County, showed promise of production with drill-stem testing at 6,992-97 ft., recovering 21 bbl. of oil and showing 7½-lb. working pressure in 14 minutes. The well is drilling ahead in shale and sand below 7,355 ft.

Two miles east of the Conroe field, Montgomery County, Atlantic Refining Co. 1 South Texas Development Co. is coring in sandy shale below 9,150 ft., with 6 ft. of gas sand logged by coring at intervals from 9,096-9,105 ft.

In the Segno field, Polk County, Gulf Refining Co. was trying to extend Wilcox production with the drilling of 1 Wing, several hundred feet from production in the I&GN RR Survey 1. Sand with an oil odor was logged at 8,500-64 ft., and the well is coring ahead in sidetracked hole below 8,534 ft. The well assures an extension of production from the Cockfield sand as drill-stem testing in the 5,300-ft. pay showed good recovery.

Jack Frazier 1 William Rice, a wildcat 8 miles southeast of Hillester, Tyler County, is drilling in sandy shale below 7,075 ft.

Two wildcats in Jefferson County were in the process of testing. Four miles southeast of Fannett, in the D. Burrell Survey, Sun Oil Co. 1 Wingate is bottomed at 9,905 ft., and a cement plug has been set preparatory to testing above 8,725 ft. Four miles

southwest of Viterbo, Glenn H. McCarthy 2 Hebert is preparing to test through perforated casing at 10,092-96 ft. Total depth is 10,227 ft.

LA.-ARK.

Caddo Pool Is Extended By Flowing Well

SHREVEPORT, La.—An extension to the Caddo field of Caddo Parish was reported last week at the McCullough, Wilson and Holcomb 1 Hall in NE SW SW 8-9n-16w. The well, located nearly a mile southwest of present production, began flowing an unestimated amount of oil after casing was perforated at 2,297-2,316 ft. in the Fredericksburg lime. A 2,000-gal. acid treatment was used. The well was started by Southern Oil & Gas Co. and later transferred to its present ownership.

ARKANSAS WILDCAT COMPLETIONS

Chicot County: Placid Oil 1 R. Mathis, N½ SE NW 21-18s-2w, dry, TD 4,657 ft.

Columbia County: Frankel Bros. 1 U. Edward, SE SW 16-17s-21w, dry, TD 8,168 ft.

NORTH LOUISIANA WILDCAT COMPLETION

De Soto Parish: A. W. Phillips 1 Anthony, SE NE 9-11n-14w, dry, TD 3,374 ft.

MISSISSIPPI

JACKSON. — The new Heidelberg field in Jasper County, which promises to be one of Mississippi's outstanding pools, gained another important producing horizon in the Eutaw sand with the showing of Gulf 1 Lewis-Morrison unit in 30-1n-13e. Fifteen feet of saturated sand was recovered in a core at 4,725-45 ft., and a drill-stem test recovered 15 bbl. of 25-gravity oil, with 9-lb. working pressure. Drill-stem testing the previous week at 4,390-4,530 ft., recovered pipe-line oil, and the well is expected to be drilled to the discovery pay at 4,900 ft. before casing is cemented for completion.

MISSISSIPPI WILDCAT COMPLETIONS

Yazoo County: Freeport Sulphur Co. 2 W. R. Hammett, 1-11n-1w, dry, TD 2,091 ft.

Freeport Sulphur 2 Hammett, 13-11n-1e, dry, TD 2,068 ft.

ALABAMA WILDCAT COMPLETION

Escambia County: Hunt Oil Co. 2 R. R. Miller Mill, NE SW 16-3n-12e, dry, TD 6,168 ft.

KANSAS

Completions Step Up Despite Bad Weather

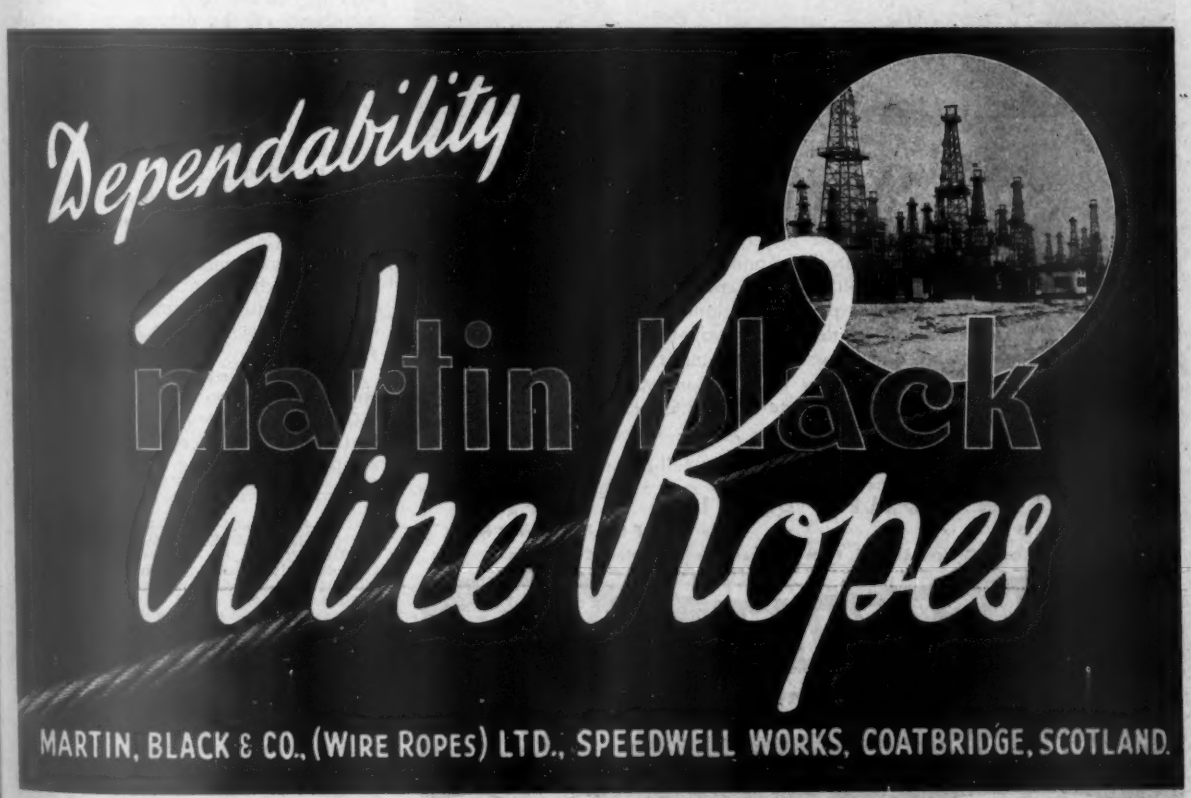
IN spite of bad weather, Kansas operators completed 42 wells last week, the highest number in several weeks. At the end of the week, interest was high in Atlantic Refining Co. 1 McCandless, SW SE 30-25-13, east of the Kipp pool in Stafford County. After penetrating the Arbuckle 50 ft. to a total depth of 4,319 ft., the well was plugged back to the Simpson sand. After perforating casing from 4,251 to 4,267 ft., and treating lightly with acid, a flow estimated at 10 bbl. of oil per hour was reported.

OKLAHOMA

New Prospects Most Hopeful In Many Weeks

THE outlook for new productive areas and expansion of recently discovered but undeveloped fields in Oklahoma is the most hopeful for many weeks as the Carter Oil Co. Cottingham and Johnson tests of the Anadarko basin showed signs of making producers; the Mid-Continent Petroleum Corp. 1 Tubbs was reported unofficially to have 65 ft. of saturation in 100 ft. of second Wilcox sand in the second well in the West Moore field; and Deep Rock Oil Co. 1 Humphreys, NE SE SE 12-25n-1w, 3 miles north of the old Tonkawa pool, checked high on the Mississippi lime indicating a fairly good chance to open a new Wilcox sand field.

The results of the Carter's Ana-



darko basin tests have been sufficiently encouraging to lift the earlier gloom that prevailed when it seemed that nothing of promise would be found. Further testing of the basin is now assured, even if neither the Cottingham nor the Johnson make commercial wells. The reports on the sand thickness in the West Moore field, if verified, will accelerate the rising interest in playing the trend along the west flank of the Nemaha Ridge; and if Deep Rock opens a new Wilcox field north of the Tonkawa pool, the old main Nemaha Ridge will be due for a thorough reworking to find fields overlooked in the first development play.

OKLAHOMA WILDCAT COMPLETIONS

Cleveland County: Phillips Pet. 1 Goodin, SW SW SE 33-9n-1e, dry, TD 6,580 ft., Viola 6,180 ft., Wilcox 6,380 ft.

Garfield County: Sohio Producing Co. 1 Schroeder, SE SE SE 29-23n-4w, dry, TD 6,123 ft., Viola 5,950 ft., Wilcox 6,056 ft., second Wilcox 6,100 ft.

Grant County: Broderick & Gordon 1 Horton, SE NE SE 34-25n-4w, dry, TD 6,111 ft., Layton 4,241 ft., Wilcox 6,042 ft.

Jackson County: Phillips Pet. 1 Martin, NE SW NW 20-3n-20w, dry, TD 3,120 ft., Arbuckle 3,095 ft.

Kiowa County: Gulf 1 Groves, SW NW NW 6-7n-17w, dry, TD 6,296 ft., Hunton 1,830 ft., Springer sand 5,450 ft.

Oklahoma County: Harper-Turner 1 Hough, NW NW 5-14n-2w, dry, TD 6,430 ft., Hunton 6,135 ft., Wilcox 6,370 ft.

Payne County: Stanolind-Amerada 1 School Land 15, NE SE SW 16-19n-4e, flowed 114 bbl. in 20 hr., second Wilcox 4,033-41 ft.

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ROCKY MOUNTAIN

Rangely Field Promises to Become an Active Area

DENVER. — A major development getting under way in the Rangely field, eastern Colorado, 10 miles from the Utah line, promises to make it one of the most active of Rocky Mountain areas. Oil of 52 gravity was discovered at shallow depth 42 years ago. In 1925-26 the old Midwest Refining Co., The Texas Co. and Tide Water Associated Oil Co. drilled several deep tests which resulted in big flows of gas in the Dakota sand, the largest gaging 74,000,000 cu. ft. One was out of control for months, the gas pressure fell, and most of the wells went to water. The deepest went to the Sundance sand. In 1931 The California Co. drilled a test to 7,173 ft., plugged back to 6,335, and was completed in the Weber sand for 200 bbl. of 34.9-gravity oil. The well was shut in until September 1943, when it was put on production.

The California Co., jointly with Equity Oil Co., is drilling its second well to the Weber, a west offset to the discovery. Wasatch is moving in at 1 McLaughlin for a deep test, a joint operation with Idaho Refining Co., an affiliate, a mile southeast of the discovery. The same interests are moving in for 1-D Gentry, 4 miles southeast of the discovery. The 1-D Gentry will be drilled to the top of the Dakota with cable tools, at which point the 10¾-in. will be set for a test. It then will change over to rotary and continue to the Weber. In addition to these, two wells are scheduled by other interests.

Sinclair-Mackinnie deal off. — By mutual consent, Mackinnie Oil & Drilling Co. and Sinclair-Wyoming Oil Co. have canceled an agreement under which the latter was to acquire the Mackinnie holdings in Elk Basin at $4 a share for Mackinnie capital stock.

Steamboat Butte discovery flows.— British-American Oil Producing Co. 2-C Tribal, 31-4n-1w, Steamboat Butte field, a discovery in the Tensleep, after drilling three producers

LEGAL

UNITED STATES DEPARTMENT OF AGRICULTURE, Soil Conservation Service, Lincoln 1, Nebraska, March 17, 1944. Sealed bids in triplicate will be received until 11:00 a.m., CWT, April 25, 1944, and then publicly opened, offering bonus for operating rights in connection with gas and oil leases on the following land, located in Blaine County, Montana: S½NE¼, E½SW¼, SE¼, Section 5, T35N, R21E; N½ Section 8, T35N, R21E; E½W½, Section 31, T36N, R21E. Award of lease will be made only to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms, and operating regulations from Chief, Administratice Services Division, Soil Conservation Service, P. O. Box 713, Lincoln 1, Nebraska.

in the Sundance, swabbed 455 bbl. and flowed 205 bbl. in the first 24 hours from the Tensleep at 6,772-7,034 ft. It is rigging up for pump test. The well is estimated at 1,000 bbl.

Program for Gage field.—Northern Ordnance, Inc., which brought in the discovery in the Gage field, Musselshell County, Montana, last November, has indicated an extensive development program with four more locations. This makes two producers completed, one well near completion, two wells drilling, and four in the preliminary stages.

WYOMING WILDCAT COMPLETION

Garland, Big Horn-Park counties: Ohio Oil Co. 5 Ohio-Kinney-Coastal unit, NW SW SW 13-56n-98w, TD 4,485 ft., 5½-in. 4,350 ft., top Tensleep 4,349 ft., pumped at rate of 135 bbl. per day on 24-hour test.

ARIZONA WILDCAT COMPLETION

Zuni, Apache County: Argo Oil Corp. 1 State, C NE NE 22-15n-29e, dry at 2,622 ft.

PERMIAN BASIN

Deep Pool Is Discovered in Southeast Crane County

MIDLAND.—A new deep producing area has been discovered in southeast Crane County by The Texas Co. 1 Charles Hobbs, Section 46, just inside the Upton County line, 4 miles southwest of the McCamey pool. This wildcat cored at 5,275-95 ft., total depth, showing oil. A drill-stem test, open 1¾ hours at 5,240-95 ft., with ⅝-in. choke, showed gas in 30 minutes, and 1,530 ft. of clean oil in 4½-in. drill pipe. The well is estimated capable of making 13 bbl. an hour. The operator will run an electric survey and will complete from the present depth if the results are satisfactory.

In the Sand Hills pool, Magnolia Petroleum Co. 10 P. J. Lea, south offset to Gulf Oil Corp. 45 Waddell gusher from the McKnight pay, plugged back and perforated at 3,125-40 ft., acidized with 3,000 gal., and flowed 6,000,000 cu. ft. of gas through 1-in. choke on 2-in. tubing. It continues testing.

Andrews County.—Extension 1 mile north was assured for the Fullerton pool when Stanolind Oil & Gas Co. and Texas 1 Logsden, Section 5, hit top of the Clear Fork pay at 6,818 ft., drilled to 7,012 ft., and was preparing to complete at this depth. Humble Oil & Refining Co. 1 Carter, Section 23, was drilling below 11,226 ft. after definitely calling top of the Devonian at 10,220 ft. Stanolind has staked 1-F Midland Farms in Section 1 to drill to the Holt pay at about 6,500 ft. This location is 10 miles east of the Clabberhill field.

Winkler County. — Final gage on Mid-Continent Petroleum Corp. 1 Wheeler, extending the Wheeler pool ½ mile east, showed 1,802 bbl. of 46-gravity oil from Ellenburger pay at 10,670-10,743 ft., total depth. Sinclair Prairie Oil Co. 4-A J. B. Walton, extending the Keystone-Ellenburger pool northwest, gaged 1,672 bbl. from total depth of 9,682 ft. Casing has been cemented on the north and south offsets to the discovery well in this pool. Magnolia 234 Walton, ¾ mile northwest of the Kermit-Ellenburger discovery, topped Ellenburger at 10,708 ft., 240 ft. lower than in the discovery well, but prospects of producing were bright.

Gaines County.—Further indications of San Andres production in the Russell pool were found in Shell Oil 1 E. H. Jones, a mile southwest of the nearest Clear Fork lime producer. This semiwildcat had a 60-ft. saturated section in the San Andres at 5,540-60 ft., but will drill on to the lower horizon. A new wildcat has been staked by Humble as its 1 M. S. Doss, 3½ miles northwest of The Texas Co. 1 Robertson, producing at 5,910-52 ft.

Pecos County.—A new world record for depth drilled is in prospect at Phillips Petroleum Co. 1 Price, Section 11, now below 11,880 ft. Same company's 1 University, Section 1, is shut down at 7,363 ft. after showing sulfur water on drill-stem test at 7,300-60 ft.

Howard County.—Guthrie and Cosden 2 Pauline Allen, Vincent pool deep-pay prospect, has plugged back to 5,500 ft. from total depth 6,672 ft., and will shoot this horizon, which had good shows of oil.

WEST TEXAS WILDCAT COMPLETIONS

Gaines County: Humble 1 R. A. Cox, Sec. 14, dry at 11,651 ft.

SOUTHEAST NEW MEXICO

HOBBS.—New deep exploration, 3 miles north of the Skaggs pool and 4 miles northeast of Continental 2-B Skaggs, deep wildcat east of the Monument pool, has been staked by DeKalb Agricultural Association. It is the association's 1 G. D. Stovall, in 8-20s-38e, scheduled to go 7,500 ft. Continental 2-B Skaggs is drilling below 3,438 ft. in lime. Another wildcat for Lea County, to go 5,000 ft., is Harvey E. Yates 1 Cities Service-State, 25-16s-33e, 3 miles northeast of the north extension to Maljamar pool. In the northwest part of the county, in the Caprock area, George P. Livermore has staked 1-F State, 30-12e-32e, to test the zone at about 3,000 ft. In Chaves County, Humble Oil & Refining Co. 1-N State, 35-14s-17e, Manning dome area, was drilling below 3,515 ft. in shale and quartzite.

SOUTHWEST TEXAS

Two New Fields Opened And More in Prospect

CORPUS CHRISTI.—With two new fields established in the Laredo district and several wildcats showing for possible pool openers, an interesting week of development was marked up for the Southwest Texas district.

Sun Oil Co. added another shallow-sand discovery for Starr County with completion of 1 J. De Solia, 2 miles northwest of the Garcia field, which is flowing at the daily rate of 120 bbl. through a ⅛-in. choke. Tubing pressure was 610 lb. and casing pressure 75 lb. Total depth is 4,023 ft., with production from sand at 3,767-69 ft. The sand section correlates with that of the Garcia field, although production is expected to be separated by faulting.

The Texas Co. 2 Yeager, a possible discovery 2 miles northwest of the Yaeger field, Jim Hogg County, was preparing to retest at 3,308-13 ft., after salt water was recovered at 3,315-17 ft.

American Republics 1 M. L. Rich-

LEGAL

UNITED STATES DEPARTMENT OF AGRICULTURE, Soil Conservation Service, Lincoln, Nebraska, March 18, 1944. Sealed bids in triplicate will be received until 11:00 a.m., CWT, April 28, 1944, and then publicly opened, offering bonus for operating rights in connection with gas and oil leases on the following land, located in Yellowstone County, Montana: S½NE¼, N½SE¼, SW¼, Section 8, T4N, R26E. Lots 1, 2, 3 and 4, E½W¼, E½, Section 18, T4N, R26E. Award of lease will be made only to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms, and operating regulations from H. C. Cole, Chief, Regional Administrative Services Division, Soil Conservation Service, P. O. Box 713, Lincoln 1, Nebraska.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that the N½ NW¼ Sec. 14, T. 26 N., R. 90 W., 6th P.M., 80 acres, Lost Soldier oil and gas field, Wyoming, is offered to the responsible qualified bidder of the highest cash bonus per acre for lease under section 17 of the mineral leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. 226). The minimum acceptable bonus is $2,000 per acre. Sealed bids will be received in the office of the Secretary of the Interior, Interior Building, Washington 25, D. C., up to 12 noon May 1, 1944. Each bidder must submit a certified check or cash for one-fifth of the amount bid, payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished by the successful bidder prior to the issuance of the lease. The deposits of the other bidders will be returned. The envelopes should be plainly marked "Bid for lease in Lost Soldier field. Not to be opened before noon May 1, 1944." No bid received after the time fixed herein for submitting bids will be considered. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

ardson, 3 miles northwest of the Bridwell field, Duval County, was officially completed for an initial production of 88 bbl. daily through a ⅛-in. choke from casing perforations at 3,945-47 ft. Location is in the H&GN Survey 18.

Hidalgo County had promise of a new discovery as Baldridge & King prepared to test 1 Richard King, 3 miles south of Aurora in the S. S. Del Tule grant. Eight feet of sand with an oil odor was recovered in a core at 7,109-18 ft., the total depth.

Deeper drilling was in line for the east side of the old Saxet field, Nueces County, with completion of Chicago Corp. 1 Weil Brothers, E. Villareal Survey. With the hole bottomed at 10,522 ft., casing was perforated at 10,190-10,216 ft., and the well is flowing at the rate of 5 bbl. of 38-gravity oil per hour through open tubing.

Arkansas Fuel Oil Co. 1 Buehrig, 3½ miles northwest of Meyersville, De Witt County, is bottomed at 9,017 ft. and casing is being cemented following an electrical survey. Side-wall cores showed possible production from sand at 7,600 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Duval County: American Republics 1 M. I. Richardson, Sur. 18, 88 bbl. through ⅛-in. choke, 3,945-47 ft., TD 3,959 ft.

Goliad County: G. E. Green 1 Huggins, M. D. J. Y'Barbo Sur., dry 4,506 ft.

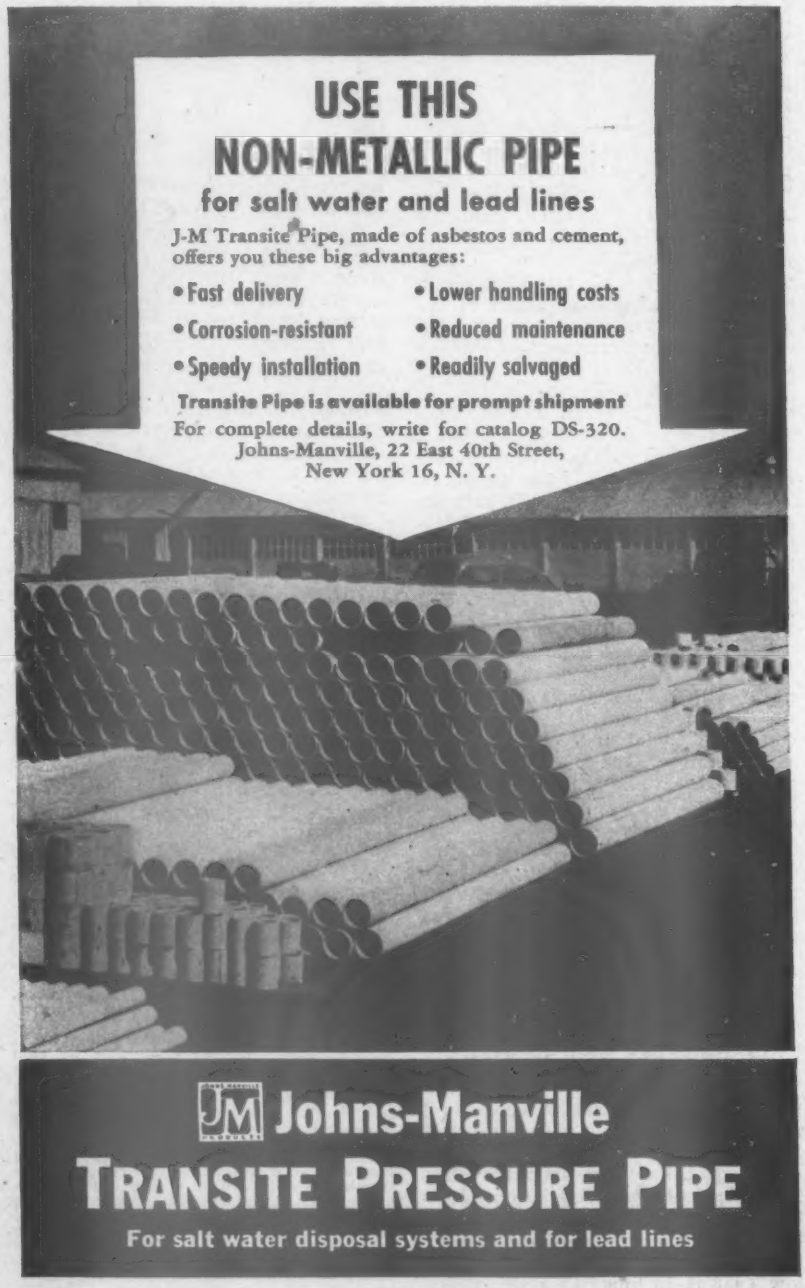
Jim Wells County: Texas 2 Tijerina, A. Canales Sur., 254 bbl. through ⅛-in. choke, perf. 7,117-25 ft., TD 7,130 ft.

Live Oak County: Humble 2 F. E. Pace, dry at 4,203 ft.

W. E. Rowe 1 Williams, 5 mi. E of Mount Lucas, dry at 4,629 ft.

San Patricio County: Humble 1 J. F. Green, T. T. Williams Sur., 270 bbl. distillate and 1,162,00 cu. ft. gas through ¼-in. choke, perf. 9,120-40 ft., TD 10,010 ft.

Starr County: Sun 1 J. De Solis, 2 mi. NW Garcia field, 120 bbl. through ⅛-in. choke, perf. 3,767-69 ft., TD 4,023 ft.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LOUISIANA GULF

Wildcats in Three Parishes Report Good Showings

NEW ORLEANS. — The Louisiana Gulf Coast had promise of new reserves as three wildcats, in St. Landry, Jefferson Davis and Calcasieu parishes, were reported to have logged favorable showings.

In the Northeast Cankton area, St. Landry Parish, Sun 1 E. M. Boagni, 48-8s-4e, bottomed at 9,800 ft., is preparing to drill ahead to the contract depth of 10,600 ft. after cementing 7-in. casing at 9,800 ft. While details of the core record are not available, sufficient showings are believed to have been logged to make a producer.

Two miles west of the Tepetate field, Jefferson Davis Parish, Barnsdall Oil Co. 1 Fuselier, 31-7s-2w, cored broken sand at 7,680-92 ft., which showed 1 to 2 per cent oil saturation by volume. No drill-stem test was attemped and the well is drilling below 9,470 ft.

In the East Moss Lake area, Calcasieu Parish, Continental Oil Co. 1 Prairie Land & Canal Co., cemented 7-in. casing at 9,650 ft., and is drilling in shale below 9,880 ft. This well is also reported to have logged showings of oil and gas.

Union Oil Co. of California 1 Edgewood Land & Logging Co., a new Cockfield sand discovery 4 miles west of Bear Creek, Beauregard Parish, flowed at the rate of 32 bbl. of 58-gravity distillate daily through a ⅛-in. choke from perforated casing at 8,767-70 ft. Tubing pressure was 2,300 lb.

Continental and Standard Oil Co. of Kansas 1 Standard Oil Co. of Kansas, a semiwildcat north of the St. Martinsville field, St. Martin Parish, cemented a protection string of 7-in. casing at 9,396 ft., and prepared to drill ahead.

Phillips 3 Faterling, a semiwildcat in the Bastian Bay field, Plaquemines Parish, is slated to be retested after flowing 10 bbl. of fluid of which 75 per cent was salt water and 25 per cent was oil. The test was made through perforations at 9,164-68 ft.

On the northwest flank of the

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2 WELDED SEAL

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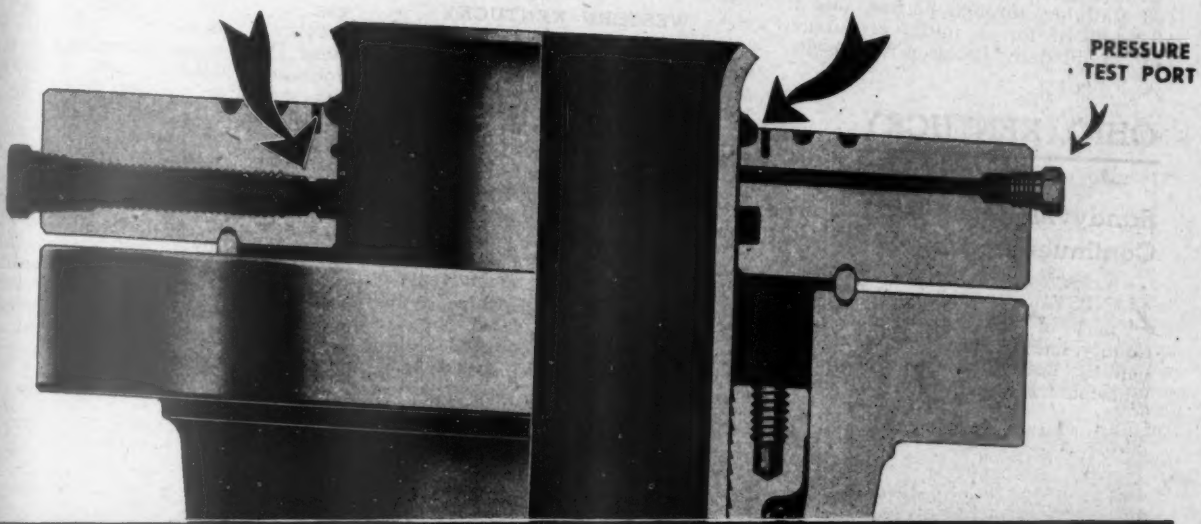

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See your Composite Catalog for complete mechanical details on all types of Cameron well heads, or descriptive literature will gladly be sent to interested operators on request.

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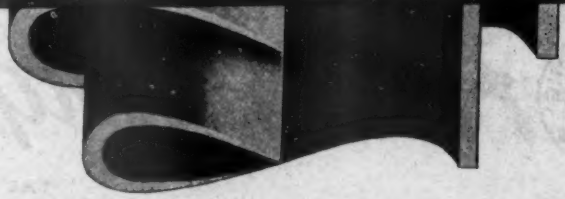

Starks dome, Calcasieu Parish, W. T. Burton 1 Fairchild, 13-9s-13w, is bottomed at 8,304 ft., with 7-in. casing cemented at 7,971 ft. This well offsets the operator's 10 Lutcher Moore, completed several weeks ago to open deep-flank production for the dome.

Gulf Refining Co. 1 Iowa-St. Martin Land Co., Section 28 Dome, St. Martin Parish, is showing promise of opening deep-sand production on the flank of this old dome as it cores below 10,976 ft. with shale and sand with an oil odor logged at intervals from 10,923-10,971 ft. Location is in 21-9s-7e.

Magnolia Petroleum Co. opened a new sand in the old Lockport field, Calcasieu Parish, with completion of 36 Mathilda, through perforations at 7,264-68 ft., for an initial production of 125 bbl. daily. Location is 9-10s-9w.

OHIO, KENTUCKY

Sandyville Gas Field Continues Active

ZANESVILLE, Ohio. — The center part of Pike Township, Stark County, had a 2,500,000-cu. ft. completion by East Ohio Gas Co. on the Wharton tract in Section 16. This is an active area of the Sandyville field with 7 drilling wells and considerable undeveloped acreage. Sand was found at 4,673-4,752 ft. with pay at 4,728-52 ft.

The south end of the Brush Creek field was extended a location to the west of the Ohio Fuel 1 Hevnor, Section 34, York Township, Morgan County. Sand at 4,221-55 ft. had a shutin volume of 1,330,000 cu. ft. The Industrial Gas Co., in endeavoring to extend the Blue Rock section of the field a mile to the northeast, found the Clinton with only a show of gas and a show of oil in the Medina sand. The well, U.S.A., Section 3, was shot and had a settled production of 25 bbl.

WESTERN KENTUCKY

OWENSBORO, Ky. — Five wells completed in Union County represented the week's results in western Kentucky. All were oil producers, the best being H. H. Weinert 2 L. Clements, which flowed 397 bbl. in 24 hours after an acid treatment of McClosky lime at 2,569-79 ft. Three other wells were completed in Cypress sand and one in Pennsylvanian sand. No wildcats were completed.

In Daviess County, 1 mile east of West Louisville and 17 miles southeast of Henderson, Miller & Shiarella et al 1 C. R. Simmons tested 25 bbl. per day from Aux Vases sand at 1,835-67 ft., and had showings of oil in several sands above the Aux Vases.

EASTERN KENTUCKY

ASHLAND.—One oil well and two gas wells were completed in eastern Kentucky during the week and drilling operations pointed slightly upward.

D. Lykins completed 1 W. M. Howard in Magoffin County at 1,052 ft. The well has not been shot, but reports indicate a 12-ft. pay sand with gas at 420 ft. Oil production is estimated at 2½ bbl. daily.

Kentucky West Virginia Gas Co. completed 742 Winston Thornbury, on the Caney Fork of Right Beaver in Knott County at 2,700 ft. in shale with a daily open flow of 492,000 cu. ft. of gas.

Inland Gas Corp. completed 252 Reed Preston, on Barnetts Creek in Johnson County at 2,393 ft. in Big Six sand, for a daily open flow of 413,000 cu. ft. of gas.

INDIANA

EVANSVILLE, Ind.—Posey, Gibson, Spencer and Pike counties had one new oil well each in the week in review, all in established pools. Continental Oil Co. 69 Bozeman land in 23-3s-14w, Gibson County, initial production 108 bbl. from Aux Vases sand at 2,763-90 ft., was the best well of the week.

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Wildcat Completions and Discoveries

	Week ended March 25, 1944					Cumulative total for 1944				
	Oil	Distillate	Gas	Dry	Total	Oil	Distillate	Gas	Dry	Total
Ohio	0	0	0	0	0	0	0	0	14	20
Indiana	0	0	0	0	0	0	0	0	3	3
Kentucky	0	0	0	0	0	1	0	0	13	14
Illinois	0	0	0	5	5	5	0	0	65	70
Michigan	1	0	0	3	4	4	0	0	48	52
Kansas	2	0	0	12	14	14	0	0	88	102
Nebraska-Missouri-Iowa	0	0	0	0	0	1	0	0	6	7
Oklahoma	1	0	0	6	7	10	0	6	49	65
Texas:										
North Central	0	0	0	6	6	7	0	0	58	65
West	0	0	0	1	1	6	0	0	29	35
Panhandle	0	0	0	0	0	0	0	0	2	2
East	0	0	0	5	5	0	0	0	32	32
Gulf Coast	1	1	0	3	5	15	4	3	51	73
Southwest	2	0	0	0	2	10	2	5	54	71
Total	3	1	0	15	19	38	6	8	226	278
Louisiana:										
North	0	0	0	1	1	2	0	0	12	14
Gulf Coast	0	0	0	0	0	2	4	0	15	21
Total	0	0	0	1	1	4	4	0	27	35
Arkansas	0	0	0	2	2	2	0	0	13	15
Mississippi and Southeast	0	0	0	3	3	3	0	0	22	25
Montana	0	0	0	0	0	1	0	0	2	3
Wyoming	1	0	0	0	1	4	0	0	5	9
Colorado, Utah	0	0	0	1	1	1	0	0	3	4
New Mexico	0	0	0	0	0	0	0	0	17	17
California	0	0	0	2	2	3	0	4	28	35
Total United States	8	1	0	50	59	91	10	24	629	754
Total previous week	6	0	1	58	65					

WILDCAT completions fell off again this week and the trend of weekly completions so far this year is slightly downward. There is no sign yet of the substantial increase that must come if PAW'S goal of 4,500 wildcats in 1944 is to be achieved. With production running at nearly 500,000 bbl. per day higher than last year, wildcatting activity, as registered by completions, is scraping along just barely above last year's levels.

Total well completions are running substantially higher than at the same period last year, February 1944 showing about 36 per cent increase over February 1943, and operations at the end of the month were 46 per cent higher than at the same time in 1943.

When total completions run high, production runs high and wildcat completions lag, the meaning is clear. Either reserves are so high that there is little need for wildcatting, or reserves are being drained heavily and not being replaced by wildcatting for some special reason, usually an economic reason. Reserves are so low that the Government professes to be worried, but it is not worried enough to take the practical counsel of the industry.

FEBRUARY COMPLETIONS INCREASE 6 PER CENT

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 (ft.)	1,000-2,500 (ft.)	2,500-5,000 (ft.)	5,000-10,000 (ft.)	Over 10,000 (ft.)	Footage	Rigs and drilling
Appalachian	*250	170	300	67	13	1	212	33	4	0	527,786	512
Ohio	79	11	278	32	36	10	24	44	1	0	200,717	186
Indiana	19	13	1,611	0	6	...	16	3	...	...	36,098	38
Kentucky	71	23	2,674	27	21	9	34	28	...	...	98,009	154
Michigan	29	12	3,100	1	16	0	12	17	0	0	120,810	106
Illinois	126	80	12,959	1	45	12	49	65	...	...	320,058	192
Kansas	115	59	17,300	1	55	0	18	97	0	0	315,984	248
Nebraska	3	2	100	0	1	0	3	0	0	0	6,517	1
Missouri-Iowa	0	0	0	0	0	0	0	0	0	0	0	6
Oklahoma	125	66	8,804	13	46	5	37	65	18	0	435,127	353
North Texas	75	47	21,566	0	28	11	26	20	18	0	229,604	53
West Central Texas	24	9	3,877	0	15	7	8	9	0	0	55,106	17
West Texas	138	120	70,909	0	18	2	5	79	51	1	641,558	186
Texas Panhandle	13	9	43,088	0	4	0	0	13	0	0	43,088	8
East Texas	7	3	1,075	0	4	0	0	2	4	1	50,300	22
Upper Gulf Coast	45	27	5,448	3	15	0	0	8	35	2	308,040	177
Lower Gulf Coast	51	32	5,462	5	14	0	0	5	45	1	327,570	132
South Central Texas	6	1	12	0	5	0	3	3	0	0	12,233	22
South Texas	24	8	1,324	1	15	0	2	11	11	0	153,243	89
Total Texas	383	256	152,761	9	118	30	44	150	164	5	1,820,742	706
Southeast New Mexico	42	27	4,010	0	15	4	7	30	1	0	43,088	31
Arkansas	19	12	3,255	0	7	2	1	6	10	0	96,194	39
North Louisiana	18	6	506	3	9	1	4	10	3	0	67,556	55
Louisiana Gulf Coast	32	20	4,691	1	11	0	0	0	16	16	203,504	162
Mississippi and Southeast	13	5	785	0	8	0	2	5	5	1	95,792	26
Montana	17	11	1,010	1	5	0	8	8	1	0	43,149	93
Wyoming	12	10	4,948	0	2	0	2	9	1	0	43,965	91
Colorado-Utah	5	3	485	0	2	0	1	1	3	0	22,411	13
Northwest New Mexico	3	0	0	1	2	1	1	1	0	0	4,468	16
California	144	126	27,778	4	14	8	39	65	26	6	467,733	215
Total February	1,505	912	247,355	161	432	73	514	637	253	28	4,968,698	3,243
Total January	1,420	884	163,019	97	439	63	511	600	223	23	4,963,246	3,076

*Does not include 143 input wells.

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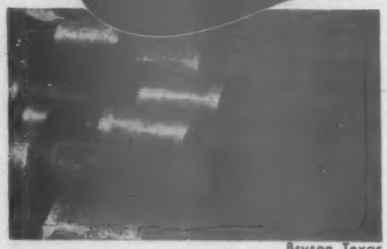
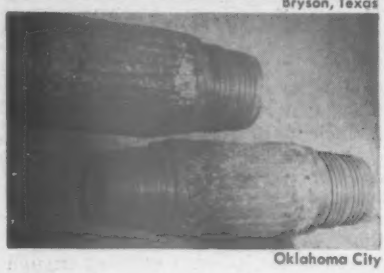


Bryson, Texas



Oklahoma City

FROM EVERYWHERE—California—Mid-Continent—Gulf Coast—Louisiana—come outstanding reports of how Stoody Hard-Facing Alloys are prolonging tool joint life and eliminating steel shortage worries for operators.

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Among the Drilling Contractors

J. R. Sharp Drilling Co., with offices in Tulsa, has opened a field office in Midland, Tex., from which all its West Texas drilling operations will be handled. Sharp has several rigs busy in the Permian Basin, some in Winkler County and some in the North Basin area.

H. H. Howell, Alice, Tex., is preparing to drill a 5,500-ft. wildcat on the C. H. Austin lease, 5 miles northwest of the Alfred field, Jim Wells County, Texas.

W. Stewart Boyle, Houston, will move a rotary to Wharton County for a 6,000-ft. wildcat on the Fred Swenson lease, 2 miles northwest of the Wharton townsite.

Loffland Brothers, Houston, have a contract from Fohs Oil Co. for 5 Grady Lee Humble, in the Gueydan field, Vermilion Parish, Louisiana.

Penrod Drilling Co. received contract for a 6,500-ft. test to be drilled in the Abbeville field, Vermilion Parish, Louisiana, for Hassie Hunt. Contract was also received from the Placid Oil Co. for 1 Marie Milliken, a wildcat in East Carroll Parish, Louisiana.

Davis Drilling Co. is scheduled to spud 1-B W. F. Almond, a 5,300-ft. test for H. F. Wilcox Oil & Gas Co. about 1 mile west of the new Brownlee field in Jim Wells County, Texas.

Allen & Morris, San Antonio, are starting a wildcat operation in Webb County, Texas, for Seaboard Oil Co. on the L. Ortiz ranch, in the Pescadito area, a projected 6,000-ft. test.

William B. Host is the drilling contractor on Freeman Oil Co. 1 Grimason et al, in NW NW SE 31-18n-4w, Clare County, Michigan.

Markley - Bankhead Drilling Co., Houston, is moving a rotary to the Arnaudville field, St. Martin Parish, Louisiana, to drill an 11,000-ft. test from Amerada Petroleum Corp.

Jack Frazier, Houston, has completed 1 Gay as a dual-sand producer to

Part of crew of Morrison Drilling Co., in Oregon Basin field, Wyoming: H. E. Carter, driller; Buck Harqus, and Ray Page

open a new Wilcox sand discovery in Colorado County, Texas. This test, drilled jointly with the Cities Service Oil Co., flowed pipe-line oil from sand at 7,667-70 ft., and gas-distillate from sand at 7,302-14 ft.

Muskegon Development Co. has been awarded the drilling contract on United Drillers & Producers, Inc. 2 Maurice A. and Flora Arms, in C N½ NW SE 7-14n-6e, Bay County, Michigan.

Housh & Thompson, Houston, have received a contract from Humble Oil & Refining Co. to drill 1-B Boyt, a wildcat 5 miles east of Hankamer, Liberty County, Texas.

Lunes Drilling Co. has received a contract from Rowe & DeLange, San Antonio, for a 4,600-ft. wildcat to be drilled on the P. A. Jancha lease, 6 miles west of Skidmore, Bee County, Texas.

Turner Drilling Co. will drill the Carter Oil Co. 1 Flachs, in SW NE SE 9-14n-7w, Mecosta County, Michigan.

I. E. Scott and Lupher Drilling Co. will drill the Pure Oil Co. 1 J. D. Peterson, in C E½ SE NW 16-11n-11w, Newaygo County, Michigan.

J. W. Gorman Drilling Co., San Antonio, is moving a rig to Duval County, Texas, for American Republics Corp. 2 M. I. Richardson, a projected 4,000-ft. test north of the company's new pool opener.

Regent Drilling Co., formerly of Shreveport, La., and Tyler, Tex., has been organized in Canada and will handle contract work in the Vermilion field, in eastern Alberta. The company had contract for 1 Franco-Hoppe, in 19-50-5w4, offsetting 3 Cannar producer, and has brought in a modern drilling outfit from Texas. Paul Bowlen, graduate of Oklahoma University, and Louis McCullough, formerly of General Petroleums, are directors.

J. R. Sharp Drilling Co. headquarters have been moved from Tulsa to Midland, Tex. Bob Franklin, manager of operations, who has been living in Lubbock, Tex., has moved to Midland.

Frank Strickland is the drilling contractor and has started operations on the B. M. Heath 1 H. Hurst, in SE SE NW 19-1s-3e, about 1 mile southeast of the village of Dix, in Jefferson County, Illinois.

Carl B. King Drilling Co. announces appointment of E. L. Durrell as assistant to J. Ed Warren, partner in the company at Midland, Tex. Durrell went to Midland from Los Angeles.

Roger Bowman has been awarded contract to drill a 5,000-ft. wildcat test in northwest Borden County, Texas. The development will be the Thomas W. Doswell 1 G. O. Thompson, C NE NE Section 22, Block 32, E.L.&R.R. Survey, T-6-N. Drilling was to start immediately with rotary. Cooperating in the venture are Magnolia Petroleum Co., Sunray Oil Co., Barnsdall Oil Co., Lucey Petroleum Corp., Homer Snowden and Mae Belcher.

Guy Craig, of **Craig & Chamberlain,** drilling contractors, has been awarded contract to drill a well for Regal Oil Co., of Great Falls, Mont. This firm is a new producing concern composed of Sen. J. W. Speer, A. F. Mavity and C. M. McCutcheon. The firm will develop an 80-acre lease in the Kevin-Sunburst field.

Oklahoma Supreme Court Upholds Drilling Contract

The state supreme court of Oklahoma has ruled that a drilling contract for a specific geological formation must be followed rigidly, and that opinion of scientists must be discounted in fulfillment of the contract. This ruling was made when the court sustained a lower court in the case of Otis Jious against J. F. Smith, Shawnee, Okla., operator. Evidence revealed that Smith had agreed to drill on the Jious land in Seminole County, going to the Cromwell sand. The well was abandoned at 2,085 ft., when geologists declared the formations were checking too low to make a producer in the Cromwell, which was expected around 3,400 ft.

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PERSONALS

FRANK WILLIBRAND

Willibrand Has New Post in Sohio's Organization

THE recent 2-day conference of officials of the Standard Oil Co. of Ohio and its subsidiary, the Sohio Petroleum Co., at Oklahoma City, found Frank Willibrand being made general superintendent of the Oklahoma City division of the Sohio Petroleum Co. The division comprises Kansas, Oklahoma, and all of Texas with the exception of the East Texas district.

He is a native of Missouri. Before entering the University of Oklahoma to specialize in petroleum engineering, he spent 8 years in California fields as a rotary crewman and driller. After graduation from college in 1931, he joined The Texas Co., at Breckenridge, Tex., as a roustabout.

He went to the Oklahoma City field in 1933 with the Phillips Petroleum Co. and filled successively the positions of roustabout, drilling engineer, lease foreman, and superintendent of wildcat drilling for Oklahoma. For a period in 1938, he was lease superintendent in Illinois. Following this tour of duty he was district superintendent for southern Arkansas for 2 years. In 1942, he was district superintendent in South Texas for the Sunray Oil Co.

In 1943 he joined the Petroleum Administration for War in Washington as a senior petroleum production analyst, leaving the agency in June 1943, to join Sohio.

He is a bachelor and enjoys golf whenever he can spare the time.

Joseph H. Russell, since 1931 assistant to the vice president in charge of production for Gulf Oil Corp., Houston, has been elected vice president of that organization and of Gulf Refining Co. In his new post he will be in charge of operations of the two companies in Texas and Louisiana. Following his graduation from University of Texas in 1914, Russell was employed by Stone & Webster. He joined Gulf as an electrical engineer in 1921.

W. G. Violette, vice president of Standard Oil Co. of Kentucky, has been made executive vice president, a new post. **A. B. Bland** was named assistant vice president.

Fred Morris, for the past 3 years southern division geologist for Cities Service Oil Co., has been advanced to manager of the division, with headquarters in Houston. He succeeds **D. L. Connelly,** who resigned to become production manager for Warren Petroleum Corp.

H. Ben Cox, formerly assistant superintendent of the land department for Cities Service Oil Co. in Bartlesville, Okla., has been made southern division landman. His office is in Houston.

Floyd Phillips has been promoted to foreman of the combined natural-gasoline plant and natural-gas division of Shamrock Oil & Gas Corp. in its Moore County, Texas, field.

Serge B. Jurenev, formerly assistant secretary and assistant treasurer of Continental Oil Co., has been promoted to secretary. **Pete Dominic** was appointed assistant secretary. **William C. Potter,** chairman of the executive committee of Guaranty Trust Co., New York, was elected a director of Continental.

Raymond D. Williams, formerly in the conservation division of Kansas State Corporation Commission, now represents the crude-oil purchasing department of Standard Oil Co. (Indiana) in Kansas. His office is in Wichita.

Charles C. Brown, who was assistant director of production in District 2, Petroleum Administration for War, with headquarters in Tulsa, has been made director, with headquarters in Chicago. He takes the place of **R. B. Kelly,** who resigned to resume his former post with Pure Oil Co. as manager of the Illinois production division. **J. K. Finlayson,** of the Chicago office of PAW, has been assigned to Tulsa to look after work formerly performed by Brown.

JAMES B. SIMMS

James B. Simms, former Noble County Judge at Perry, Okla., has been named assistant to **Bert H. Lincoln,** chief chemist for Continental Oil Co. He will perform liaison duties between Continental's research laboratories in Ponca City, Okla., and the U. S. Patent Office in Washington and will assist Lincoln in handling patent applications. Following graduation from the University of Oklahoma law school in 1938 Simms practiced law in Tulsa until 1941. Before taking his law course Simms studied chemical engineering at University of Cincinnati and University of Tulsa.

Charles S. Larkey, engineer for Sinclair Prairie Oil Co., Tulsa, has been chosen president of Oklahoma Society of Professional Engineers. He succeeds **M. J. Fuller,** of the U. S. Army Engineers, who was transferred to Dallas. **D. H. Jones,** first vice president, has also resigned because his work with the state highway department makes such demands upon his time.

Alton C. Sailstad has been named manager of the supply and transportation committee and the distribution and marketing committee of District 2 Petroleum Administration for War. He had been assistant manager of the old supply and distribution committee. He succeeds **C. R. Musgrave,** vice president of Phillips Petroleum Co.

Burton Jordan, who was a member of the scouting staff of The Carter Oil Co. in Mattoon, Ill., has been made district landman at Mount Pleasant, Mich.

A. E. Barnes, Jr., and **P. M. Konkel,** in the geological department of The Ohio Oil Co., have been transferred to the Houston division. Barnes,

formerly at Owensboro, Ky., is now at Midland, Tex. Konkel, formerly at Marshall, Ill., was assigned to Houston.

R. C. Addison, scout for Ohio Oil Co. in the North Texas district, with headquarters in Wichita Falls, has been promoted to landman. **R. Z. Mendenhall,** a Marine Corps veteran wounded in the Guadalcanal landing, succeeds Addison as scout.

Chester F. Yunker, of Long Beach, general superintendent of oil operations for Del Amo Estate Co., was elected president of California Stripper Well Association at its annual meeting. **Edwin P. Crail,** president Crail Brothers, Inc.; **E. F. Demond,** vice president Exeter Oil Co., Ltd., and **R. G. Wilbur,** independent oil operator, were elected vice presidents. **Thomas H. Work,** Nordon Corp., was elected secretary-treasurer, and **Richard Fenton,** executive vice president. Yunker formerly served as resident geologist for Richfield Oil Corp., chief engineer for Italo Petroleum Corp., and a consulting petroleum engineer and independent oil producer. He discovered the Yunker sand at Long Beach.

C. F. YUNKER

W. M. Osborne, independent geologist, has joined Western Co., Fort Worth, and will serve as a member of the organization's Midland, Tex., staff.

Maurice Machris, executive vice president of Wilshire Oil Co. and a member of various PAW committees, was recently elected treasurer of the wildcat committee of the California Oil and Gas Association.

Karl H. Schmidt, formerly with U. S. Bureau of Mines at Laramie, Wyo., has joined the geophysical department of Arkansas Fuel Oil Co. at Shreveport, La.

H. T. Wyatt, in charge of exploration and field operations for Shell Oil Co., Inc., on the Pacific Coast, has resigned, ending 19 years' association with Shell. His plans were not announced.

Lawrence A. Bebeau, head well puller for Shell Oil Co., Inc., in the San Joaquin Valley, has been promoted to production foreman in the Oilfields division, San Joaquin Valley.

Frank Andrews, since 1940 sales manager for Hycar Chemical Co., affiliate of Phillips Petroleum Co. and producer of butadiene-type synthetic rubber, has been appointed sales manager for the Philblack division of Phillips. Andrews, who has been with Phillips 15 years, will retain his post with Hycar.

Coe S. Mills, formerly district geologist for The Ohio Oil Co. in Lafayette, La., has been named division geologist for the Tampa, Fla., division.

C. D. Lockwood, recently connected with the Petroleum Administration for War office in Washington, has resigned to join the staff of the Railroad Commission of Texas, oil and gas division. Lockwood formerly published the Texas Oil Report, and before that was a writer for The Oil and Gas Journal.

Maurice A. Finney has been named superintendent of Pure Oil Co.'s Texas producing division, with headquarters in Fort Worth, succeeding **Harold F. Schoonover,** recently retired. Finney, who went to Fort Worth from Olney, Ill., where he was acting division manager, joined Pure in 1924 as assistant to the production superintendent in the Mexia district of Texas after working several years as tool dresser and driller following graduation from William Jewell College.

T. A. Watkins, field foreman in the Pampa, Tex., district of Gulf Oil Corp.'s Gulf Coast production division, has been transferred to the Borger, Tex., office as assistant superintendent. His work in the Pampa district has been taken over by **H. H. Threatt,** formerly of the Dial district.

Charles S. Lavington, for many years geologist in the Rocky Mountain territory for Continental Oil Co., has resigned to engage in business as a consulting geologist, with headquarters in Denver.

M. W. Bowen, Socony-Vacuum Oil Co., Inc.; **E. F. Johnson,** Standard Oil Co. (N. J.), and **P. W. Parker,** Standard-Vacuum Oil Co., have been elected directors of the National Foreign Trade Council.

Howard W. Cheney, formerly an employe of Lockheed Aircraft Corp., has been appointed assistant to **R. S. Macmillan,** president of Macmillan Petroleum Corp., Los Angeles.

Jack Reed, San Joaquin Valley division drilling foreman of Union Oil Co. of California, recently became a member of the company's 40-year club, and at a recent dinner **Ronald Gibbs,** manager of field operations, presented him with a check for $2 to cover poll-tax deductions made 40 years ago before he became of age.

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More than ever before you need valves that can "take it."

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ORBIT WING VALVE

ORBIT WING VALVE

This valve is especially designed for Wing Service. Made in 2" size only in both flanged and screwed ends. Opening through valve is 1⅛". Seats of cast Stellite J Metal.

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will last for the duration. Meanwhile, if you have any questions regarding their care or maintenance, write us.

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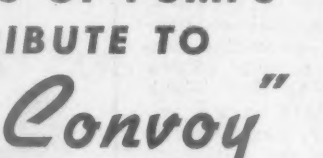

Fig. 3720

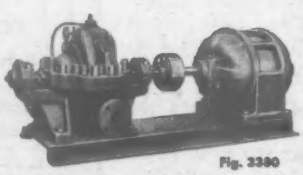

Fig. 3380

Goulds
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AXELSON LINERS
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Seal the bottom of an Axelson Liner with your hand, or place it upright on a rubber mat, and a steel ball of proper size will be supported by the pressure of air trapped within the liner. Place any number of liners on top of the first and still the ball will not drop through . . . so perfectly are the faces and the inside of each liner finished. This simple but spectacular demonstration is convincing proof of the accuracy with which Axelson pumping equipment is made . . . to guarantee the efficiency of your production operation.

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AXELSON MANUFACTURES AND *SERVICES*
DEEP WELL PLUNGER PUMPS & SUCKER RODS

Market Developments

THE record wartime delivery of 1,790,960 bbl. daily of crude oil and petroleum products to the East Coast during the week ended March 18 served to emphasize the readjustment of transportation facilities.

Soon it will be possible, transportation authorities say, to divert more tank cars to some of the less adequately served interior points. The contemplated shift will be possible as soon as the emergency products line establishes capacity deliveries on a substantial basis.

The previous wartime peak of deliveries to the East Coast was 1,710,000 bbl. daily established during the week ended December 4, 1943.

Easing of the supply situation on the East Coast is continuing with the improvement being felt in all products. Deliveries through the little-inch pipe line have been the principal contributing factor to the general improvement. Ample supplies of light heating oil, which had been the most critical product, are now available and with the arrival of more temperate weather demand has eased off accordingly.

The new plan for distribution of petroleum supplies under Directive 59 met with the opposition of directors of the Empire State Petroleum Association at its annual meeting last week in Syracuse. They held it perpetuated existing inequities and offered a substitute designed to prevent original suppliers from improving direct sales at the expense of secondary suppliers. The association also opposed ban on R coupon sales, suggesting that they be numbered serially to prevent abuses.

In a plea for closer understanding between large integrated oil companies and independent oil marketers, Walter L. Faust, vice president and eastern marketing head of Socony-Vacuum Oil Co., suggested to the Empire State Petroleum Association that various groups of jobbers and independents, now operating as individual associations, combine into one representative body so that full understanding and cooperation might be achieved between it and the oil companies.

A further suggestion for "standing side by side for the common good" was that a forum of the American Petroleum Institute be formed "fully within the antitrust laws" and with proper representation from large and small companies. "Let's ask the Department of Justice to sit in with us in our discussions," Mr. Faust added.

In the Mid-Continent territory demand for the whole line of oil products was urgent, with kerosene probably at the top of the list in point of the inability of refiners to keep abreast of orders. Inquiries were coming from both the eastern and midwestern regions, but a common response was, "We have none." A close second in tightness was 702 diesel oil, large quantities of which are sought by the Navy and which is not unlike No. 2 burning oil in its general characteristics.

Heavy demand for gasoline and for any motor fuel adapted for tractor use was reported from agricultural areas, and requirements were expected to become more insistent as spring weather develops.

Natural-gasoline manufacturers said they were just about keeping even with customer requirements, but could move more 26-70 to northern points if they had it.

A.P.I. Refinery Report

Week Ended March 18, 1944

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	156	3,280	347	1,400
Ind., Ill., Ky.	769	20,056	2,943	5,481
Okla., Kans., Mo.	351	6,187	1,256	1,562
Censored area*	2,268	37,080	15,316	14,416
Rockies	113	2,177	539	375
California	780	15,405	30,609	8,574
Total 3-18-44	4,437	86,185	51,010	31,808
Total 3-11-44	4,387	86,559	51,362	32,705
Total 3-20-43	3,592	94,477	68,299	32,933

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
March 18, 1944	236,119,000
March 11, 1944	236,746,000
March 20, 1943	238,417,000

*Excludes unrefinable stocks in California.

REFINERY PRICE SUMMARY

(Prices as of March 21, 1944)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	72-74	68-70	63-66
Mid-Continent*	‡6.00-6.25	5.750-6.000	.....	5.625
Gulf Coast	6.00-6.50	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	9.2	9.2	.....
California	.....	6.255-6.500	5.750-6.125	5.125-5.500

*Basis Group 3. †1939 C.F.R. (research method). ‡Inland Texas and adjoining counties in Arkansas and North Louisiana. §Unleaded.

KEROSENE AND DISTILLATE FUEL OIL

Product:	Kerosene†	No. 2	No. 3	No. 5	No. 6‡
Mid-Continent*	4.125-4.375	3.500-3.625	3.375-3.500	$0.85	$0.80-1.27
North Louisiana*	4.125-4.375	3.500-3.625	.....	.....	0.80-1.27
Pennsylvania	6.000-6.125	5.875-6.125	5.875-6.000	.....	.....
California	4.500-5.500	5.500	5.500	§1.10-1.25	§1.10-1.15
Northeast Coast	6.800	6.700	6.700	1.95	1.65
Gulf Coast	4.125	3.750-3.875	.....	1.35	0.85

*Reflecting OPA ceilings, depending on destination of shipments. †Quotations for 41-43 gravity. ‡Range depends on gravity. §Pacific Specification 300. ¶Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.875	5.500

LUBRICANTS

PENNSYLVANIA GRADE—	
Bright stock,* 10 pour point	30.5
Bright stock,* 25 pour point	25.0
Steam refined, 600	15.0
Neutral oil,† 10 pour point	34.0
Neutral oil,† 25 pour point	28-32.5
*No. 8 color, 145-155 at 210, 540-550 flash. †150 vis. at 70° F., 3 color, 400-405 flash.	
MID-CONTINENT—	
Bright stock, 150-160 D, 0-10	23.00
Neutral oil,‡ 200-3	15.00
‡0 to 10 pour point.	
GULF COAST—	
Pale oil, 200-3	8.75
Pale oil, 500-3½	10.00

WAX

Oklahoma, 124-126, w.c.s.	4.250
Pennsylvania, 122-124, w.c.s.	4.250
NEW YORK (in bags)—	
Refined, 130-132 (A.m.p.)	7.00
Crude, 124-126 (W.s.)	6.00

TANK-WAGON PRICES

(Gasoline prices based on regular grades in cents per gallon.)

	Dealer tank wag.	Combined tax	Kero. tank wag.
Baltimore, Md.	15.95	5.5	10.5
New York	16.10	5.5	10.1
Philadelphia	16.20	5.5	11.9
Washington, D. C.	15.20	4.5	11.3
Chicago	14.10	4.5	10.6
Cleveland, Ohio	14.50	5.5	*9.0
Atlanta, Ga.	18.90	7.5	*11.5
Denver, Colo.	14.50	5.5	11.0
San Francisco	14.50	4.5	11.5
Tulsa	16.50	7.0	8.5

*Includes 1-cent state tax.

Equipment Progress

Monel Metal Floats for High-Pressure, High-Temperature Service

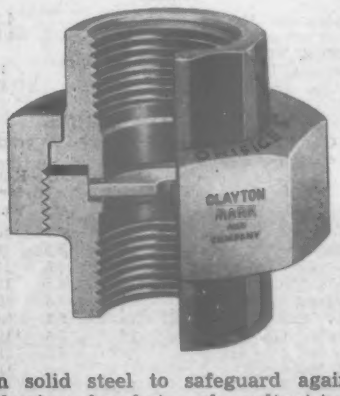
A new line of hollow-metal floats for use in steam traps, liquid-level controllers, and similar float-actuated mechanisms has been developed by Chicago Float Works, Inc., 2330 South Western Avenue, Chicago 8, Ill., to meet the need for corrosion-resistant floats for service at working pressures up to 300 lb. per sq. in., and temperatures up to 750° F.

Two types of float construction are available, both employing monel-metal shells. In one the joint is brazed with high-temperature silver solder, and connection fittings are silver brazed; in the other the shells are welded with monel metal, and connection fittings are either silver brazed or welded. The silver-brazed construction provides a smooth exterior surface. Floats of either type are available in a range of sizes from 2 to 8 in. diameter, spherical (ball) shape only. A variety of standard brass or monel-metal connections is available, or floats can be made without connection.

New Orifice Union

Clayton Mark & Co., originators and pioneers of steel unions since 1912, has produced a new screwed easy-to-handle orifice union to meet a popular demand for a simple, low-priced union.

The accompanying sectional view shows the orifice plate and steel jacketed asbestos gaskets set in a groove,



in solid steel to safeguard against blowing of gaskets and resultant trouble. The union is recommended for 600 lb. steam or 2,000 lb. cold working pressure.

This new orifice union was brought out early in 1942 and since then the company has furnished between 500 and 600 orifice unions to each of the new 100-octane refineries and synthetic-rubber plants. They are widely used in other fields for flow control of steam, gas, air and liquids, also in chemical plants for mixing and vaporizing heavier fluids.

Riggers' Forming Vise

A new riggers' vise for splicing and clamping wire rope and cable for forming around the thimble or in forming slings has been announced by Patrick-McDermott & Co., 1042 South Olive Street, Los Angeles, known as the P-M portable riggers' forming vise.

This equipment is particularly adaptable to oil-field operations because it will handle all diameters of wire rope and cable from ⅜-in. to 1½-in. diameter without the use of size adapters.

The vise is designed and built in such a manner that the shaft levers give complete and easy control of both front and back jaws. Wire rope or cable is securely held and formed in the vise, with guards to protect the Acme screw threads from damage and friction of the wire rope. Rigid construction assures great strength and durability. Operations are conducted in a minimum length of time.

Specifications: Weight approximately 115 lb.; length of base, 19½ in.;

front of base, 17½ in.; jaw spread, 10½ in.; front screw, 1⅞-in. Acme thread on right and 1¼-in. thread on left; jaws of hardened steel; screw shaft of alloy steel; slots in base dovetailed to accept dovetailed jaws; base drilled with four ⅝-in. holes for mounting in flat or horizontal position.

Among Equipment Men

Knudsen Heads New Allis-Chalmers Department

T. C. Knudsen has been named manager and chief engineer of the new Texrope department established by Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

The new department, which will handle the Texrope line of multiple V-belts and sheaves, was established as part of a reorganization move, in which Allis-Chalmers set up a separate basic industries department. Since the Allis-Chalmers organization developed the Texrope line in 1925, the multiple V-belt power transmission section had been a part of the milling machinery department.

Knudsen has been closely associated with the Texrope drive from its inception and played a major part in its development. He entered the employ of Allis-Chalmers in 1922, as a member of the milling machinery department.

Le Roi Appoints Meyers, Promotes Brown

Le Roi Co., Milwaukee, Wis., has announced the appointment of Alfred

A. A. MEYERS

CECIL BROWN

A. Meyers as advertising manager. In 1926 Meyers joined Harnischfe-

ger Corp. and advanced to the position of assistant advertising manager. He remained with Harnischfeger until late last fall going to A. O. Smith Corp. as a member of the advertising staff where he worked for several months before going to Le Roi Co.

Le Roi also announces the promotion of Cecil Brown to assistant sales manager. Brown has been active in various capacities with Le Roi since 1938.

With 13 years of experience behind him, he came to Le Roi as chief draftsman of air compressors, where many engineering changes were made under his supervision. When the United States Engineer Corps called for bids, it was his department that designed a compressor which became the accepted unit for the Engineer Corps.

Burt Vice President of Grant Oil Tool Co.

C. E. BURT

The merger of Sorensen-Burt Manufacturing Co., a copartnership consisting of A. W. Sorensen and C. E. Burt, with Grant Oil Tool Co., returns C. E. Burt to his many friends in the oil industry with which he has been associated for the past 23 years, having been with General Petroleum Corp., and for the past 20 years with Baker Oil Tools, Inc., as vice president and manager of engineering and production. Burt's duties with Grant Oil Tool Co. are in the capacity of vice president and assistant general manager.

Wickwire Spencer Appoints Allington Sales Research Engineer

Dean Rollans, vice president in charge of sales of Wickwire Spencer Steel Co., announced the appointment of H. C. Allington as sales research engineer.

Allington will be in charge of the development and expansion of markets for the company's products with particular emphasis in the oil fields.

Prior to joining Wickwire Spencer, Allington was district manager of Logan-Allington Co., Inc., for 12 years. He has also been associated as district sales manager with the Sharpsville Boiler Works Co., Sharpsville, Pa., and sales manager of the Schlanger divisions of American Machine & Metals, Inc., of New York and East Moline, Ill.

Allington will be located at the company's executive offices, 500 Fifth Avenue, New York.

Ives Named Ad Manager Of Walter Kidde & Co.

Gordon F. Ives has been appointed advertising manager of Walter Kidde & Co., Inc., manufacturers of carbon dioxide fire extinguishing and inflation equipment, replacing C. E. Gischel, who has been appointed director of product development, in charge of postwar planning. Ives has been in the production department of the Kidde company since 1942. Previously he was engaged in market research and sales promotion for Westinghouse Electric International Co.

Fick Named Timken Vice President

John E. Fick, superintendent of the Steel and Tube Division of Timken Roller Bearing Co., Canton, Ohio, became vice president in charge of the same division at a recent meeting of the company's board of directors.

At the same meeting, E. S. Hoopes, Jr., assistant general superintendent, was appointed general superintendent of the Steel and Tube Division.

In 1922 Fick entered the metallurgical laboratory of the company; in 1925 he became assistant metallurgist; in 1928, assistant superintendent of the Steel and Tube Division; and in 1937, general superintendent. He was elected a director of the company in 1940.

Hoopes went to Timken in 1932 as a steel sales representative, after 3 years spent in industrial engineering at the Union Drawn Steel Co., Beaver Falls, Pa.

Frasche Plant Manager for Goodrich at Miami, Okla.

J. W. Frasche has been named plant manager of the new tire factory now being constructed in Miami, Okla., by The B. F. Goodrich Co.

Frasche, a graduate of Iowa State College, Ames, Iowa, in mechanical engineering, joined Goodrich in 1928 as a member of the company's processing division training school.

He was assigned to the industrial products division and later to the company's purchasing department, becoming manager of purchasing at the Oaks, Pa., manufacturing division.

He was appointed operating manager at the company's plant in Clarksville, Tenn., and served there until August 1940, when he was transferred to the California division in charge of purchasing.

The start of the large-scale production of synthetic rubber for the Government by B. F. Goodrich brought Frasche to Louisville, Ky., where he directed the early operations of a large plant there.

He then was in charge of the completion and first production of rubber in a similar plant near Borger, Tex., and is now at the company headquarters in Akron, Ohio, before taking over the new assignment in Oklahoma.

Grant Davis Joins Standard Steel

Standard Steel Corp., Los Angeles, Calif., manufacturers of paving plants, batching equipment, subgraders, finishers and other construction equipment, announces the appointment of Grant Davis as sales manager. Davis comes to Standard Steel with a broad national experience, covering a period of 18 years in the construction field, gained principally through his association as general sales manager with the Shovel and Crane Division of Lima Locomotive Works, Lima, Ohio, and as West Coast district manager with Koehring Co. at Milwaukee.

Omega to Builders

H. S. Chafee, treasurer of Builders Iron Foundry, Providence, R. I., and L. E. Harper, president of Omega Machine Co. of Kansas City, Mo., announce a consolidation whereby the latter becomes a wholly owned subsidiary of Builders Iron Foundry. Harper continues as president and director of Omega and the company will continue at its present address, 3409 East Eighteenth Street, Kansas City.

Builders Iron Foundry was established in Providence in 1820. Since 1889 this company manufactured the "Venturi meter." Builders' comprehensive line of flow meters, controllers, gages, etc., is now distributed by Builders-Providence, Inc., a division of the parent company.

Omega Machine Co., established in Kansas City in 1928 by E. E. Harper, has developed a line of related products including both volumetric and gravimetric dry feeders and continuous lime slakers.

This merger brings together Builders-Providence, Omega and Builders'

associate company, %Proportioneers, Inc.%, each a specialist in its own field. %Proportioneers%, as engineers and manufacturers, produce a complete line of liquid chemical feeders employed in the treatment of water and sewage, as well as proportioning devices for industrial process blending and treating. R. P. Lowe, president of %Proportioneers%, joins Chafee and Harper in the anticipation that this merger will be mutually beneficial particularly in helping them to serve more effectively the several industries for which their products are designed.

Agee Named Rector Sales Representative

R. L. Agee has been appointed as a sales representative by Rector Well Equipment Co., working in the Texas Gulf Coast and South Texas. He has been in the oilfield specialty and supply business for the past 25 years, and formerly operated his own specialty business in Corpus Christi, Tex. He was a driller for Hausteca Petroleum Co. in the Tampico district boom days.

Chester S. Hendry Joins Buchen Co. Export Dept.

Chester S. Hendry, formerly executive vice president of Grant Advertising, and in charge of Brazilian developments for that company, has joined the export department of Buchen Co., Chicago, advertising agency.

During his association with Grant, Hendry was given leave of absence to serve as executive secretary of the U. S. Inter-American Commission during its organizational phase. He was born in Mexico of American parents and received his education at University of Wisconsin. Following experience with the Chicago Tribune and Charles Daniel Frey Co., he joined Grant Advertising in 1940.

Bradie Heads American Sand-Banum Co.

American Sand-Banum Co., Inc., of 9 Rockefeller Plaza, New York City, manufacturers of Sand-Banum boiler and engine scale and corrosion eliminants, announces the election of Louis Bradie to the office of president of the corporation to fill the vacancy created by the death of its former president, George A. Kubler. Bradie has been secretary and treasurer of the corporation since it was founded by Kubler in January 1926. Bradie continues as treasurer.

Announcement is also made of the appointment of F. Fullgrabe, formerly assistant secretary, to the office of secretary.

Vaniman to Head Fruehauf Exports

R. L. VANIMAN

Harvey C. Fruehauf, president of the Fruehauf Trailer Co., has announced that R. L. Vaniman, who recently resigned as director of the Automotive Division of War Production Board, has been named vice president in charge of exports for the Fruehauf company.

Vaniman was called from Capetown, South Africa, to come to Washington as deputy chief of WPB's automotive branch just 1 month after Pearl Harbor. He was appointed chief of the branch 7 months later.

Vaniman went to London in 1932 as director and general manager of Chrysler Motors, Ltd., and Dodge Brothers Britain, Ltd. In 1935 he became special assistant to the chairman of the board for the export division. In 1939, as executive manager of the African division, he set up a distributor's assembly plant in Capetown.

Prior to his association with Chrysler, Vaniman was a consulting engineer for such varied enterprises as Electrical Testing Laboratories, Lord & Taylor of New York, Canadian Pacific Railroad, Hudson Bay Co., and Union Stockyard & Transit Co. of Chicago. While in Chicago he was president of the Produce Terminal Corp.

Classified Advertising

The Market Place for the Oil Industry

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FORMS CLOSE 9:00 A.M. MONDAY
Published Each Thursday

LEASES AND DRILLING BLOCK

FOR SALE: Oil lease on choice Florida oil land, also mineral rights. Write owner. R. R. Starnes, P.O. Box 7, Orlando, Fla.

WEST TEXAS — New, long term leases, lowest price, cheapest rentals, large or small tracts. Do you have block anywhere you want drilled, OR do you want block to drill. Information and maps write: F. L. Welch, 1711 Roosevelt Ave., San Antonio, Tex.

LEASES AND DRILLING BLOCKS

NEW MEXICO
STATE OIL AND GAS LEASES

Humble Oil & Refining Co., now drilling a scheduled 7,500 foot test. Other major oil companies own lease blocks near test. I offer 40 acres and multiples thereof in same area. Write for information. HARRY S. WRIGHT, New Mexico State Leases, Farmington, New Mexico.

WANTED to buy or lease: Shallow Production. Have portable drilling and clean-out equipment. Ed Mosher, Longmont, Colorado.

FOR SALE: 100 acre new 10 year lease, close up to production, two wells to be drilled soon. Lots of activity. $5 per acre. Write C. A. Parker, Box 451, Center, Texas.

WANTED: Producing Oil and Gas leases in Elk and Cowley County, Kansas. Please give full description in first letter. P.O. Box 1148, Ponca City, Oklahoma.

SECURITY IN LAND, now and after the war. Located in developing oil area. Investment with attractive speculation $5 to $10 per acre. Terms. S. W. Pressey, Pueblo, Colo.

LEASES ROYALTIES

PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma
Louisiana and Illinois.
Inquiries Invited.

B. D. BUCKLEY
60 Broadway Drive, Clayton
St. Louis, Mo.

Classified Advertising

SITUATIONS WANTED

FOR oil drilling locating we use the Multiple Gravitation Insulation Geology Block System. A positive method. We can locate oil pools from airplane. Draper & Co., Seymour, Iowa, Route 1.

EXECUTIVE ENGINEER, age 39, 20 years active experience sound organizations, refining and heavy chemical field. Well versed equipment, processes, engineering, estimating, and construction. Desires contact management where this experience can be used. Box C-203, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION or Drilling Supt. Age 38, married, draft exempt, 18 years experience driller, tool pusher both rotary and cable tools. Now employed field engineer. Best references and certificate available. Box C-231, The Oil and Gas Journal, Tulsa, Okla

FIELD Representative — familiar with lease-purchasing — stores and construction divisions. Several years specializing in asphalts and road oils construction field. Age 39. Location desired central states—would consider other locations. Available at once. Address Box C-229, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEER, thirty-six years old with fourteen years experience in refinery operation, development and research, including majority of latest catalytic processes, wants position as refinery superintendent. He is now Manager of War Project involving design and construction of complete modern refinery. Salary now is twenty thousand per year but for permanent position in stable company would consider seven thousand. Present job ends in about six weeks. Box C-245, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Position by a thoroughly experienced oil and gas engineer, Geological training, very efficient in drilling and fishing, high pressure equipment design, transmission equipment and maintenance; strictly sober, excellent health. Will go where services are desired. Box C-244, The Oil and Gas Journal, Tulsa, Okla.

DRILLING AND PRODUCTION

Superintendent 41 years old, married, 23 years experience in the southwest as independent operator and drilling contractor would like to make connection with large independent or drilling contractor. Available immediately. Would consider buying substantial interest. Write Box C-243, The Oil and Gas Journal, Tulsa, Okla.

COMPETENT warehouseman, material man with general office and inventory training, desires connection. Box C-193, The Oil and Gas Journal, Tulsa, Okla.

MAN with proven executive ability is desirous of making a connection with sound progressive organization. To such an organization can offer: 10 years successful managing experience of sales force exceeding 100 men; 15 years practical field experience in hiring, training, developing personnel. Sound practical knowledge of fleet operations, supervision. 15 years traveling Texas, S.E. States. A personal record that invites most thorough investigation. Age 39. Draft exempt, in excellent health, free to travel. Write P.O. Box 1130, Birmingham, Ala.

ASST. SUPT.: 25 years refinery operating experience. Draft classification 4A. Have statement of availability. Position must have postwar future. For personal details, address Box C-240, The Oil and Gas Journal, Tulsa, Okla.

SALESMAN: 15 years in Oklahoma, Kans. and West Texas, experienced in sales engineering, all types of oil field construction, derricks, specialty products, know steel and welding procedures, no objection to large territory. Address, Lynch, Cadillac Hotel, Oklahoma City, Okla.

CAN be available on reasonable notice to any company requiring a capable sale executive. Over 20 years' experience in refinery sales and general oil marketing. Box C-211, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

REFINERY SUPERINTENDENT

WANTED by aggressive independent refinery with sound background, to take over complete refinery operations, maintenance, etc., in 3,500-barrel skimming-Dubbs Cracking plant in District Two. Must be experienced with good record of practical operations and ability to handle men. Conditions most excellent and a very desirable position. State qualifications, draft status, age, salary desired, and any other pertinent information. Box C-204, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Construction superintendents and general foremen for general construction work. Must be familiar with all phases of construction in refineries and chemical plants. Should have some knowledge of operations. Give complete information, age, education, experience, ability, salary, availability, draft status. Replies confidential. Reply Box C-209, The Oil and Gas Journal, Tulsa, Okla.

INSTRUMENT MEN

WANTED immediately by new aviation gasoline refinery using latest instruments. Should be fully experienced in maintenance, calibrations and adjustments on Fisher, Foxboro, and Brown Measurement and control instruments. Write Personnel Manager, Associated Refineries, Inc., Duncan, Oklahoma.

A LEADING production and fishing tool manufacturer wants to employ two high-class salesmen, one for drilling equipment sales and one for production equipment sales. Prefer a man with practical field experience, or better still with engineering training and practical experience. No social engineers or high-pressure salesmen need apply. Our sales force has been informed of this ad. Write Box C-201, The Oil and Gas Journal, Tulsa, Okla.

DESIGN ENGINEER WANTED: One of the leading manufacturers of production and drilling tools wishes to employ a highly capable engineer with ability to design and improve tools and supervise engineering department. Our engineering department knows that this ad is being run. Write Box C-202, The Oil and Gas Journal, Tulsa Okla.

FORMER ENGINEERING STUDENTS—Major oil company desires applications of persons who are interested in getting into the petroleum industry and who have been engineering or geological students in a reputable school or university. Experience helpful but not essential. Do not apply if employed in essential activity at highest skill. Box C-241, The Oil and Gas Journal, Tulsa, Okla.

ESTABLISHED PUBLIC ACCOUNTING FIRM HAS JUNIOR AND SEMI-SENIOR OPENINGS. PERMANENCY AND ADVANCEMENT. REPLY IN DETAIL. CERTIFICATE AVAILABILITY. BOX 224, CHEYENNE, WYOMING.

• • • • WANTED • • • •

Major oil company with continent-wide operations and research seeks graduate technical men of the following qualifications:

MECHANICAL ENGINEERS—with petroleum refinery or similar experience. Should be familiar with refinery design, estimating, construction, mechanical equipment, engineering materials, and utilities systems. Process knowledge desired although not essential.

CHEMISTS AND CHEMICAL ENGINEERS interested in research, design, or plant operation. Should have training and experience in refinery or other industrial organizations.

Work not of a temporary nature. In reply state experience, education, age, marital status, draft classification and salary expected, include small snapshot (not returnable). Replies strictly confidential. Applicants now employed at highest skill in war industries not solicited. Box B-670, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

WANTED: Office man to serve as District Clerk for large independent. Must be familiar with materials and all records pertaining to production and drilling. State age, draft classification, experience, etc. Box C-222, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEERS with experience in any of the following petroleum refining operations (1) light ends recovery equipment, absorbers, stabilizers, etc. (2) catalytic cracking equipment or (3) crude distillation equipment and similar processing units. State in detail educational background, positions held with detailed explanation of work handled, age, and number dependents also draft status. Box C-165, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Combination Dubbs Topping Plant operators; Combination power plant boiler operators; Pumpers; Still helpers, combination topping and cracking; Refinery Pump Mechanic, and refinery machinist. Location, inland Texas independent refinery. Box C-155, The Oil and Gas Journal, Tulsa, Okla.

WANTED—INSTRUMENT MEN

FOR new Aviation Gasoline Refinery consisting of Catalytic Cracking, Alkylation, and Isomerization units. Location, Middlewest. In reply give detailed outline of previous experience, education, draft status, and required earnings for 48-hour week. Reply Box C-223, The Oil and Gas Journal, Tulsa, Okla.

MAJOR oil company has openings available for graduate petroleum engineers having at least 3 years acceptable experience general oil field development. Salary open. All hiring will be done in accordance with War Manpower Commission Stabilization plans. Reply to Box C-221, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED PETROLEUM ENGINEER—Between 28-45 for development and research work on rubber products for use in petroleum industry. Permanent essential job with midwestern rubber company with outstanding record of consistent growth and progressive planning. International business. Now developing postwar expansion program. State experience, education, salary requirements, etc. All inquiries acknowledged. Box C-238, The Oil and Gas Journal, Tulsa, Okla.

MAJOR oil company wants man with personnel and industrial relations experience for permanent position of Supervisory Training Conference Leader in Midwest. State age, experience, education, draft status. Those in essential industry need not apply. Availability certificate required. Box C-224, The Oil and Gas Journal, Tulsa, Okla.

TRADE paper has excellent position for engineering writer familiar with drilling and other oil field practices. Previous writing experience not a requisite. Box C-242, The Oil and Gas Journal, Tulsa, Okla.

REFINERY ENGINEERS

Established designing and contracting concern needs one process and one sales engineer in Southwest territory, one sales engineer for either East or Midwest territory.

Give complete information first letter. Box C-220, The Oil and Gas Journal, Tulsa, Okla.

EMPLOYMENT OPPORTUNITIES FOR FOREIGN SERVICE

The Arabian American Oil is interested in receiving applications from technically educated men, and/or men with oil field experience, for work in Saudi Arabia. This offers a splendid opportunity for advancement and postwar security, with good working conditions, hospital and medical care, liberal benefit plans, and vacation privileges in the United States.

Write or apply to our Relations Department

ARABIAN AMERICAN OIL CO.
200 Bush Street
San Francisco 4, California

ADVERTISERS IN THIS ISSUE

Allis Co., The Louis 27, 28
American Meter Company 44
American Roller Bearing Co. 132
American Steel & Wire Company 66
American Well & Prospecting Co., The 103
Armstrong Machine Works 136
Associated Piping & Engineering Co., Inc. 126
Axelson Manufacturing Company 144
B & W, Inc. 141
Babcock & Wilcox Company 98, 99
Babcock & Wilcox Tube Co., The 25
Badger & Sons Co., E. B. 32, 33
Baker Oil Tools, Inc. 141
Bantam Bearings Div., The Torrington Co. 2
Baroid Sales Div. 39
Beaumont Iron Works Co. 122
Bechtel Co., The W. A. 11
Busch-Sulzer Bros.-Diesel Engine Co. 24
Cameron Iron Works, Inc. 135
Carey Mfg. Co., The Philip 16
Caterpillar Tractor Co. 42
Clark Brothers Company, Inc. 20, 21
Classified Advertising 149, 150, 151
Cleveland Trencher Company 118
Columbia Steel Company 68
Continental Supply Company, The 87
Cooper-Bessemer Corp., The 60
Coppus Engineering Co. 3
Crane Co. 7
Davis Regulator Co. 114
Dean Brothers Pumps, Inc. 144
Dehydro Company, The 101
Dodge Division, The Chrysler Corp. 6
Dravo Corp. 114
Dugas Engineering Corp. 130
Duraloy Company, The 92
Emsco Derrick & Equipment Co., D + B Div. 91
Ensign Carburetor Company, Ltd. 34
Equipment Engineers, Inc. 119
Foote Bros. Gear & Machine Corp. 17
Foreman Company, C. S. 118
Four Wheel Drive Auto Co. 127
Gates Rubber Co., The 18
Goulds Pumps, Inc. 144
Gray Tool Co. 43
Griscom-Russell Co. 13
Halliburton Oil Well Cementing Co. ..... Inside Front Cover
Hanlon-Buchanan, Inc. ..... Front Cover
Harrison Equipment Co. 128
Hazard Wire Rope Division of American Chain & Cable Co., Inc. ..... Inside Back Cover
Hughes Tool Co. ..... Back Cover
Hunt Tool Company 31
Jensen Brothers Manufacturing Co. 125
Johns-Manville Corporation 134
Kennedy Valve Mfg. Co., The 125
Ladish Drop Forge Co. 111
Leeds & Northrup Co. 5
Le Roi Company 77, 78
Levingston Shipbuilding Co. 84
Leyman Manufacturing Corp. 125
Lufkin Rule Co., The 79
MacClatchie Mfg. Co. 37
McCullough Tool Co. 96
McKee & Company, Arthur G. 83
McKissick Products Corp. 116
Marley Co., Inc. 12
Martin, Black & Co., Ltd. 131
Martin-Decker Corp. 104
Mayfair Hotel 138
Midwest Piping & Supply Company, Inc., The 106
Mission Mfg. Co., The 137
Murray Iron Works Co. 113
National Airoil Burner Co., Inc. 119
National Supply Co., The 70, 71
National Tube Co. 22, 23
Naylor Pipe Company 129
Norton Company, The 31
Oceco Div. of The Johnston & Jennings Co. 80
Oil Well Improvements Co. 143
Oliver United Filters, Inc. 88, 89
Pacific Pump Works 4
Pacific Wire Rope Co. 9
Patterson-Ballagh Corporation 30
Patterson Steel Company 138
Pennsylvania Salt Mfg. Co. 40
Perco Division of Phillips Petroleum Co. 106
Petroleum Electric Power Association 81
Petroleum Engineering, Inc. 74, 75
Petroleum Rectifying Company 19
Pritchard & Co., J. F. 112
Rector Well Equipment Co., Inc. 141
Schlumberger Well Surveying Corp. 10
Security Engineering Co., Inc. 95
Shand & Jurs Co. 41
Smith Contracting Co. 119
Southern Mill & Mfg. Co. 1
Spicer Mfg. Corp. 115
Standard Oil Co. of Indiana 26
Standard Steel Corp. 36
Stoody Company 113, 117, 140
Timken Roller Bearing Company, Steel and Tube Division 29
Tretolite Co. 73
Tri-Lok Company 114
Tuboscope 69
Union Asbestos & Rubber Co. 48
Universal Oil Products Co. 65
Vapor Recovery Systems Co. 39
Wagner Electric Corp. 8
Warren Petroleum Corporation 139
Wheeling Machine Products Co. 139
Wilson Supply Co. 14, 15
Wisconsin Motor Corp. 138
Youngstown Sheet & Tube Co. 89

Journalisms:

PRACTICAL application of mass spectrometry, one of the newest tools available to the industry for speedy analysis of hydrocarbon gases, will be offered Journal readers in next week's Engineering and Operating Section. Full reproduction of this paper presented by J. G. Schaafsma, General Petroleum Corp., before the California Natural Gasoline Association, tells how the mass spectrometer is normally used in analyzing all gas samples at the company's Torrance, Calif., refinery.

ALSO, a staff article will describe how The Ohio Oil Co. has stimulated production from stripper properties in the older fields of Illinois by repressuring.

ANOTHER timely article deals with one of the country's outstanding safety programs in refinery operation. The author, Paul C. Shea, vice president of Colonial Beacon Oil Co., deals in minute detail with organization of the program, how it is administered and other particulars which aided in establishing a 2-year record of no lost-time accident at the company's Everett, Mass., refinery.

CALENDAR

A.G.A., war conference on industrial and commercial gas, Hotel Seneca, Rochester, N. Y., March 30-31.

April

INTERSTATE OIL COMPACT COMMISSION, quarterly meeting, Roosevelt Hotel, New Orleans, La., April 3 and 4.

AMERICAN CHEMICAL SOCIETY, Hotels Cleveland and Statler, Cleveland, Ohio, April 3-6.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual meeting, Rice Hotel, Houston, Tex., April 10, 11 and 12.

N.G.A.A., annual meeting, Baker Hotel, Dallas, Tex., April 12-14.

A.P.I., PRODUCTION DIVISION, eastern district, Deshler-Wallick Hotel, Columbus, Ohio, April 13-14.

SEVENTH ANNUAL MIDWEST POWER CONFERENCE, Palmer House, Chicago, April 13-14.

NATIONAL OIL SCOUTS AND LANDMEN'S ASSOCIATION, annual meeting, Dallas, Tex., April 24-25.

I.P.A.A. AND NATIONAL STRIPPER WELL ASSOCIATION, midyear directors meeting, Bradford, Pa., April 27, 28 and 29

May

A.I.M.E., Gulf Coast Section, annual meeting, Houston, Tex., May 8-10.

NATIONAL OIL AND GAS POWER CONFERENCE, sponsored by A.S.M.E., Tulsa, May 8-10.

A.G.A., NATURAL GAS DEPARTMENT, spring conference, French Lick Springs Hotel, French Lick, Ind., May 11-13.

A.P.I., Mid-Continent Section, Production Division, Mayo Hotel, Tulsa, May 25-26.

June

CANADIAN GAS ASSOCIATION, annual meeting, Royal Connaught Hotel, Hamilton, Ont., Canada, June 8.

A.P.I., SOUTHWESTERN DISTRICT, PRODUCTION DIVISION, Rice Hotel, June 13-14.

A.S.T.M., forty-seventh annual meeting, Waldorf-Astoria Hotel, New York, June 26-30.

September

N.P.A., annual meeting, Hotel Claridge, Atlantic City, N. J., September 20, 21, 22

October

C.N.G.A., annual meeting, Biltmore Hotel, Los Angeles, October 13.

November

A.P.I., annual meeting, Stevens Hotel, Chicago, November 13-16.

The OIL AND GAS JOURNAL

AMMUNITION FOR Victory
STA-VOL-ENE
STABILITY VOLATILITY ENERGY
IT'S A "NATURAL"
GASOLINE is ammunition — life-blood of planes, tanks and all mechanized equipment . . . to help supply this vital fuel, Hanlon-Buchanan is supplying Butanes and Stabilized Natural Gasoline — STA-VOL-ENE the "Natural" known throughout the World.
AIR CORPS U.S. ARM
Hanlon-Buchanan, Inc
PIONEER NATURAL GASOLINE MANUFACTURER
EXPORT TERMINALS
TULSA, OKLAHOMA
NATIONAL BANK OF TULSA BUILDING
FOREIGN REPRESENTATIVE
Reyes, Williams & Co., Ltd.
4 Lloyd's Ave.
London, England

PRICE 20 CENTS

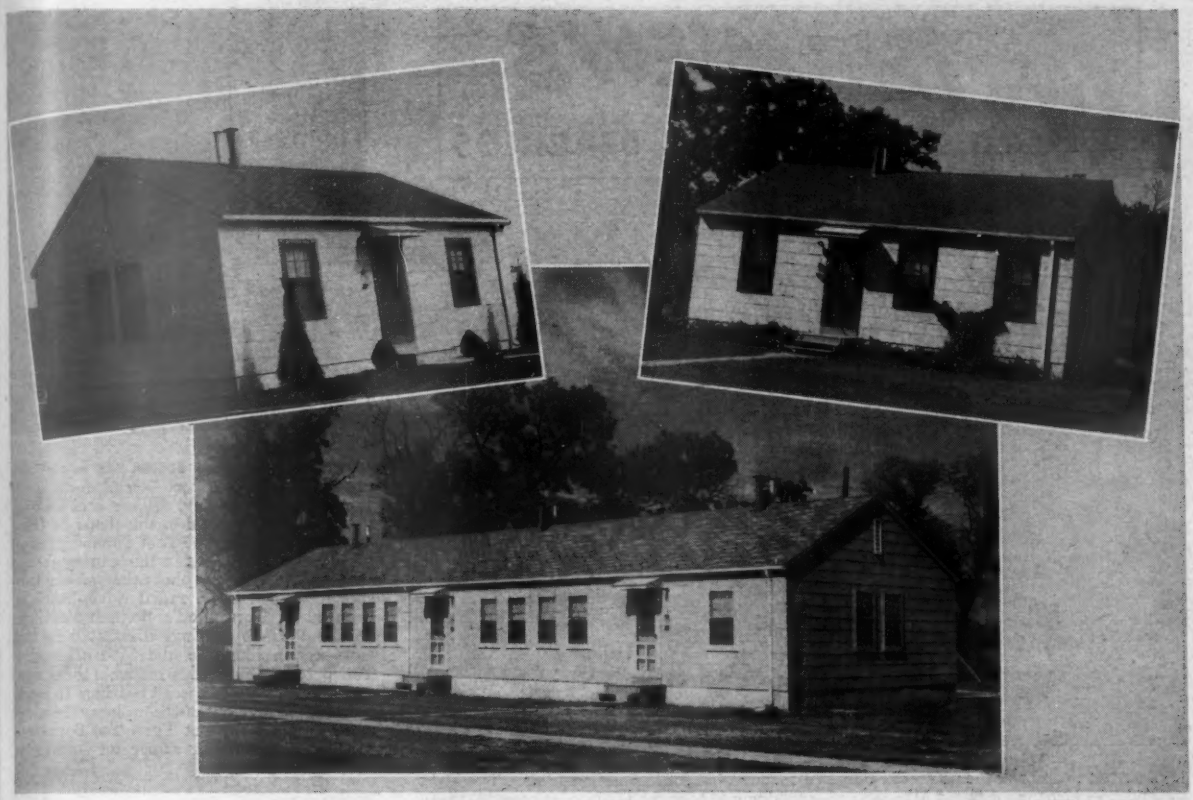
MARCH 30, 1944

SAFETY *through* EXPERIENCE

There's something reassuring about experience—something which gives you confidence no matter what special problems your well might present . . . Halliburton experience embraces the successful cementing of more than *400,000* oil wells, involving every imaginable condition and combination of conditions . . . There's safety in such experience, and with operators who value their investment, it's safety first, last and all the time!

HALLIBURTON OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA



Try These For Size

STURDYBILT prefabricated, demountable houses can be erected to your own specifications for nearly any size structure you may require. The STURDYBILT 4' by 8' precision built wall sections are interchangeable and can be fitted together side by side, or at right angles. Sections for doors and windows may be arranged to suit your needs; and inside walls can be placed so that room sizes will meet your requirements.

Thus STURDYBILT houses can be used whether you need a small tool house, a number of lease houses, a bunk house, or a large recreation hall.

Manufacturers of Special Millwork; Distributors of Johns-Manville Insulation, Roofing and Siding Shingles; Curtis Factory-built Woodwork.

Because they meet exacting specifications for all types of housing, STURDYBILT prefabricated, demountable houses are ideally suited to the oil and kindred industries. They can be delivered anywhere a truck can go . . . thus you'll find these modern houses hundreds of miles from a railroad in many parts of the country. They can be erected quickly, too, even when only semi-skilled or unskilled labor is used for the job. When you need any kind of housing send us your specifications and we will show you how STURDYBILT prefabricated, demountable houses can be erected to meet them.

STURDYBILT

LEASE HOUSES • BUNK HOUSES • PIPELINE CAMPS and STATIONS
WAREHOUSES • GARAGES • RECREATION HALLS • TOOL HOUSES

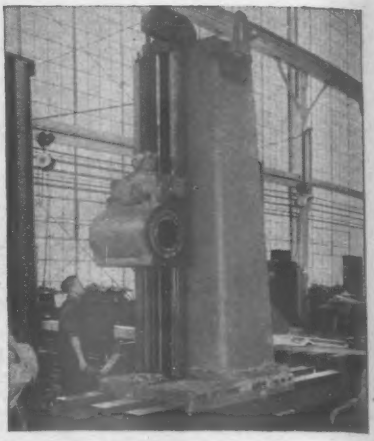
Prefabricated • Demountable Houses

SOUTHERN MILL AND MANUFACTURING COMPANY

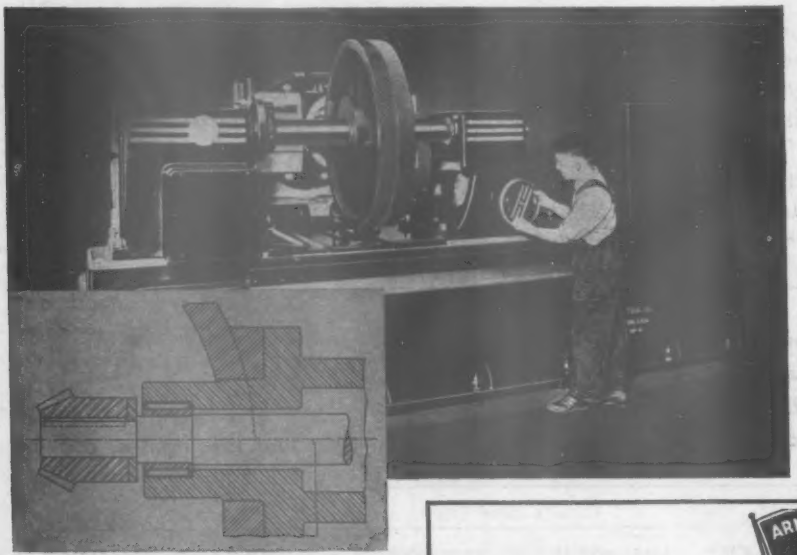
Wichita, Kansas *Tulsa, Oklahoma* *Longview, Texas*

IN THE NEWS
WITH TORRINGTON BEARINGS

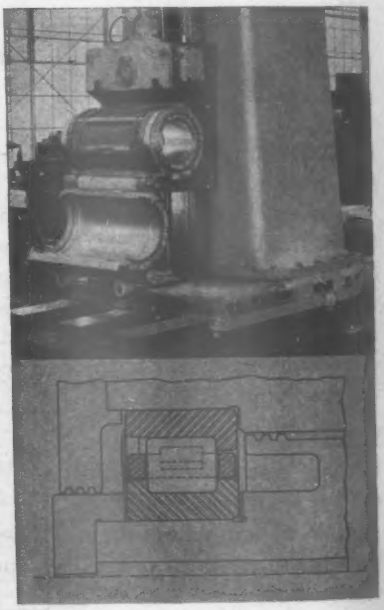
TANK BUSTERS must pack the power not only in armament but for locomotion as well. The M-12 shown here which mounts a 155 MM. field gun and designed to have all the speed and mobility of a tank, was among the first of our Army's fleet of tank destroyers. In the compact, efficient power plants of these modern weapons are small, heavy duty Torrington Needle Bearings—used to carry and transmit the heavy loads under the toughest imaginable service conditions. For applications such as automotive transmissions, universals and differentials, the high unit capacity, small size and efficient lubrication of Needle Bearings make them ideal for all radial load applications.



SUPPORT FOR A 24-FOOT BORING BAR is the job of this large end support bearing for a floor type horizontal boring, drilling and milling machine photographed in the shops of Giddings & Lewis Machine Tool Company. Supporting this huge shaft in the housing shown open in the close-up photo (below) are two special 18-inch O. D. radial roller bearings supplied by Torrington's Bantam Bearings Division. These bearings illustrated in the cross-section illustrate the type of service Torrington is equipped to render in the design and manufacture of special bearings to meet the unusual and out-of-the-ordinary bearing requirements. Why not TURN TO TORRINGTON for specialized assistance on your next bearing problem?



GEARS FOR TURBINES up to 4 feet in diameter and 20-inch face width are processed on this Michigan Tool Company's gear finishing machine. Several key points in the infeed mechanism are mounted on Torrington Needle Bearings to insure smooth, frictionless operation. Typical is the application of a Torrington Type DC Needle Bearing (with hardened inner race) on the hand operated infeed shaft shown in the cross-section.



ARMY E NAVY

TORRINGTON BEARINGS

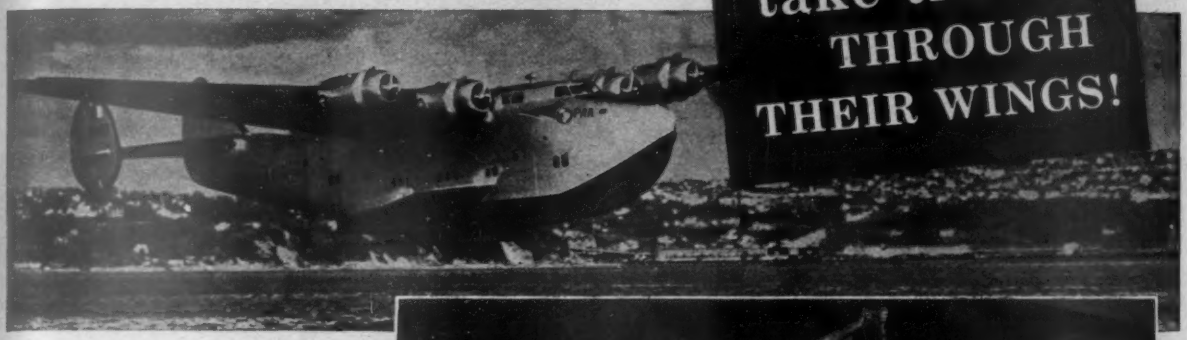
STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION

SOUTH BEND 21, INDIANA

Pan Am Clippers

take the air THROUGH THEIR WINGS!



HOW would *you* like working inside the wing of a plane where air seems to be rationed by the cubic inch? Ever fit an ornery part there while the sweat runs into your eyes and off the end of your nose? If you haven't — try it sometime — you'll understand why 100% efficiency is utterly impossible under such conditions.

Coppus Ventilator furnishing fresh air to wing compartment

This problem has been solved by Pan American World Airways at its new million-dollar Miami hangar, one of the largest in the world. Here Coppus Ventilators supply fresh air to employees working in confined compartments, fuselages and wings. These same Coppus Ventilators are used for field service, too.

Pan American is one of many leading airlines using portable Coppus Blowers and Exhausters to step up production wherever bad air or heat threatens health and efficiency. And Coppus Blowers are used even to inflate barrage balloons for testing seams.

At low cost, you, too, can bring to workers a continued supply of invigorating cool air. The "Blue Ribbon" (a blue band) is your assurance of quality performance at lowest cost. Send for specific information on Coppus Blowers and Exhausters for cable manholes, tanks, shipholds and general man-cooling. Use the coupon.

MAIL COUPON To Coppus Engineering Corp., 603 Park Ave., Worcester 2, Mass.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

A COPPUS "BLUE RIBBON" PRODUCT

DESIGNED FOR YOUR INDUSTRY ...ENGINEERED FOR YOU

- ☐ in aeroplane fuselages, wings, etc.
- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ on boiler repair jobs.

Other Applications:

- ☐ general man-cooling.
- ☐ cooling motors, generators, switchboards.
- ☐ exhausting welding fumes.
- ☐ freshening air where men are working or material is drying.

NAME.....

COMPANY.....

ADDRESS.....

CITY.....

Write here any special ventilating problem you may have .....

Pumping Problems

CONTACT PACIFIC

- **BRAINS TO THINK THROUGH**
- **BACKING TO CARRY THROUGH**

Whatever your pumping problems may be, PACIFIC Engineers will have the answer.

Whether you hold priorities to buy now or are planning future requirements, you are interested in one thing – trouble-free *pumping service* – pushing fluid through, efficiently and economically, under the conditions that prevail in your sphere of operations. New and expanding production, new processes make new demands on flow equipment.

Anticipating this, Pacific Engineers developed the finest and most complete line of precision pumps known. Pumps that meet every conceivable variation in pumping conditions. Pumps that defy temperatures, chemicals, acids, corrosion, sand and whatnot. Exclusive features that give long years of service with low maintenance, in plants around the globe.

PACIFIC PUMP WORKS

Executive Offices and Plant: Huntington Park, California • *Export Office:* 30 Rockefeller Plaza, New York • *Sales and Service:* Offices in principal cities in the United States • *Affiliated Companies:* Dresser Manufacturing Co., Bradford, Pa.; Clark Bros. Co., Inc., Olean, N. Y.; The Bryant Heater Co., Cleveland, O.; Van der Horst Corp. of America, Cleveland, O., Olean, N. Y.; Bovaird & Seyfang Mfg. Co., Bradford, Pa.; Dresser Manufacturing Co., Ltd., Toronto, Ont., Canada.

PACIFIC *Engineered* PUMPS

Operator checks pH of water from dehydrator, as shown by Micromax pH Rec order. Other Micromax instruments are Pneumatic Temperature Controllers.

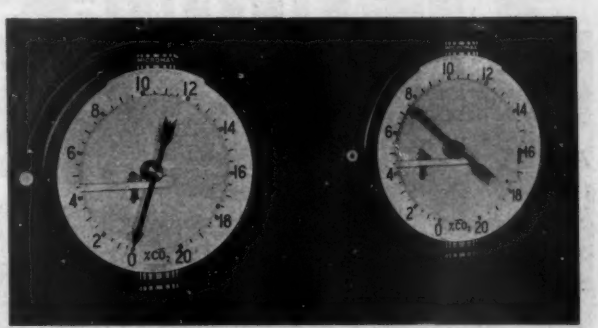
NEW PETROLEUM PRODUCTS?
See MICROMAX for CO_2, pH and other Recorders

Do you know that you can record or control not only temperature, but also CO_2, pH and (sometimes) pump speed, with Micromax instruments? You can, and you'll get the same dependable service in each case.

CO_2 recording for revivifiers, etc., employs the same equipment so widely used in power plants. It is easy to install, and requires hardly more attention than does a temperature recorder. The round-chart Micromax is generally specified, especially if the operator must keep an eye on it and halt the revivification at the proper point.

Recording pH of dehydrator water is a quick way to help reduce tube corrosion because it guides the operator in adding the correct amount of caustic or ammonia. For details, see Bulletin N-96R-702(A).

When pumps are driven by synchronous-type electric motors, a Micromax Frequency Controller in the power plant can hold the generator at highly constant speed and thus automatically assure the same constancy for the pump motor. The arrangement is extremely simple, and is described in Catalog N-56-161(1), sent on request.



Micromax CO_2 Recorders; note wide scale and great visibility.

depends on me!

Jrl. Ad N-0701(4)

LEEDS & NORTHRUP COMPANY, 4959 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

BUY WAR BONDS

4,500,000 TRUCKS, AND THEIR MILLIONS OF DRIVERS, ARE SERVING AMERICA'S VITAL HOME FRONT!

TUNE IN MAJOR BOWES, CBS THURSDAY, 9 P. M. E.W.T.

DEPENDABLE

DODGE SERVICE

KEEPS YOU "ON THE JOB"

CARS

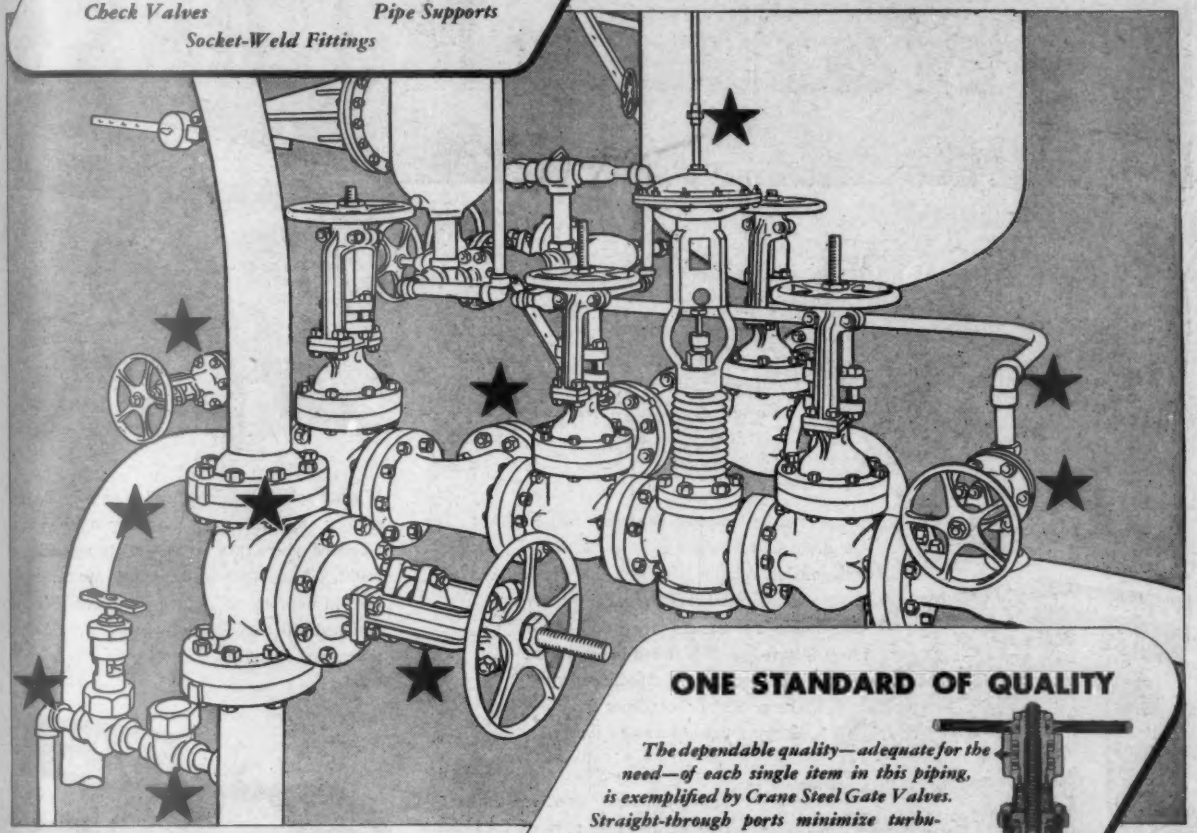
TRUCKS

While more than 300,000 Dodge-built Army vehicles are serving our fighting forces, hundreds of thousands of dependable Dodge *Job-Rated* Trucks are serving factories and farms in America's gigantic war-production task. Devoted to the war effort, too, are thousands of Dodge Dealers . . . working and serving . . . making sure that "it's a long way to the last mile of a dependable Dodge."

DODGE *Job-Rated* TRUCKS

Whatever the need in Piping, CRANE can supply it

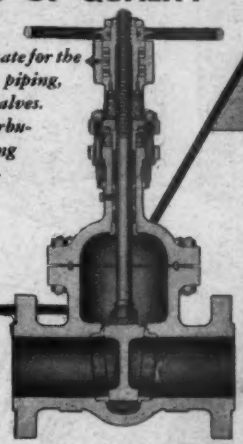
Globe Valves
Gate Valves
Flanged Fittings
Unions
Check Valves
Socket-Weld Fittings
Gaskets and Studs
Screwed Fittings
Relief Valves
Pipe Bends
Pipe Supports



Charging Lines to Fractionating Tower in Oil Refinery

ONE STANDARD OF QUALITY

The dependable quality—adequate for the need—of each single item in this piping, is exemplified by Crane Steel Gate Valves. Straight-through ports minimize turbulence, erosion, resistance to flow. Strong tee-head disc-stem connection, ball-bearing yoke, and non-corrosive stem bearings assure smoothest operation. Extra long guide ribs make seating positive.



CAST STEEL WEDGE GATE VALVES

ONE SOURCE OF SUPPLY... ONE RESPONSIBILITY

for all materials... Only a source as complete as Crane, can offer these advantages. For every piping system, not only the valves and fittings, but every part, from pipe to gaskets and studs, are regularly available from Crane. Where else, but in the world's greatest line of piping materials, could you expect a selection that meets every need, of quality that's always dependable. And that's assured by Crane Co.'s 89-year leadership in the piping field. CRANE CO., General Offices: 836 S. Michigan Avenue, Chicago 5, Ill.

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

FOR THOSE "TOUGH JOBS"

WHERE THE SURROUNDING ELEMENTS ARE DESTRUCTIVE OR HAZARDOUS

use Wagner MOTORS

TOTALLY-ENCLOSED

Wagner CP totally-enclosed fan-cooled motors are designed to operate under adverse conditions in atmospheres that contain dust, dirt, abrasives, steel chips, filings, acid fumes, and other harmful elements.

SPLASH-PROOF

Wagner splash-proof, squirrel-cage polyphase motors are built to operate dependably in locations where they are subject to splashing water, oil, or other liquids. They are widely used in unprotected outdoor locations, being designed with complete self-protection against rain, snow and sleet.

EXPLOSION-PROOF

Wagner explosion-proof polyphase motors are designed to operate in locations where "flammable volatile liquids, highly flammable gases, mixtures or other highly flammable substances are handled or manufactured, used or stored in other than original containers." Approved by the Underwriters' Laboratories for Class 1, Group D hazardous locations.

CHEMICAL-PROOF

Wagner chemical-proof motors are of totally-enclosed, fan-cooled construction and designed to resist the action of acids, fumes, moisture and other harmful elements encountered in chemical manufacturing. A moisture-proof and dust-tight conduit box protects the motor against dust, fumes, or moisture. Special drain plugs in end-plates and conduit box are provided for removing any condensation from the motor or conduit box.

MOTORS
TRANSFORMERS
UNIT SUBSTATIONS
INDUSTRIAL BRAKES
BRAKE LINING

M44-8

Write FOR BULLETINS MU-182 and MU-183

Everyone interested in electric motors should have Wagner Bulletins MU-182 (Wagner Polyphase Motors) and MU-183 (Wagner Single-Phase, Direct-Current, and Small Polyphase Motors). Helpful information also will be found in Bulletin MU-26A (Instructions for Installing and Operating Wagner Polyphase Motors).

ARMY (E) NAVY

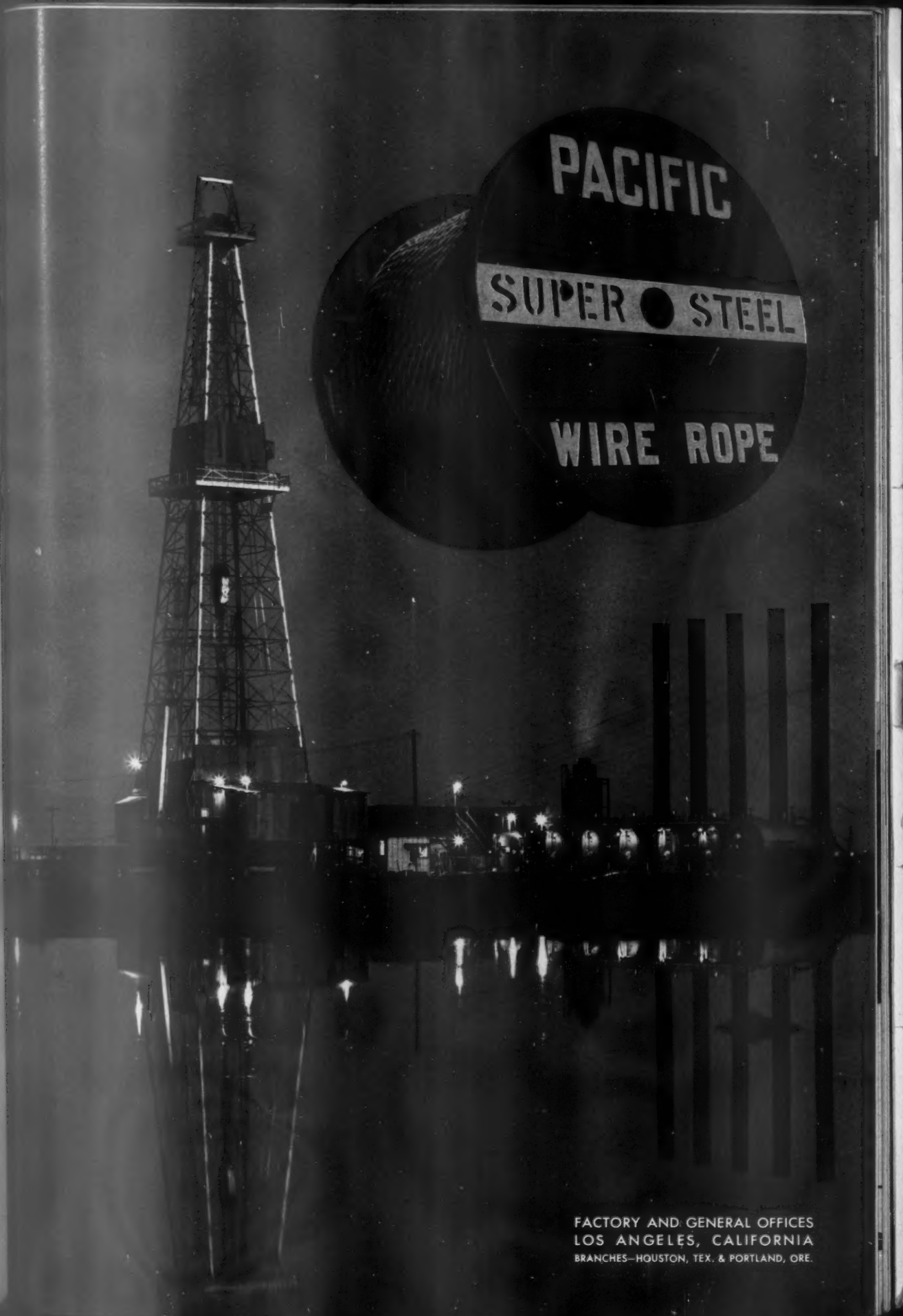
NATIONAL SECURITY EMPLOYER

Wagner Electric Corporation

ESTABLISHED 1891

6389 Plymouth Avenue, St. Louis 14, Mo., U. S. A.

ELECTRICAL AND AUTOMOTIVE PRODUCTS

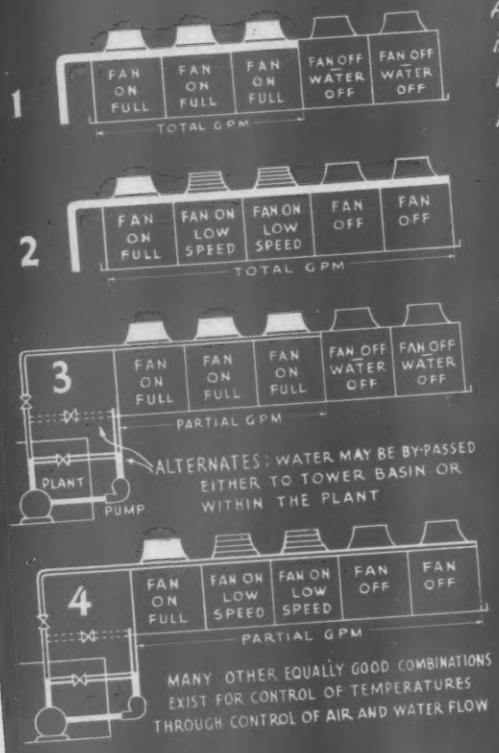


FACTORY AND GENERAL OFFICES
LOS ANGELES, CALIFORNIA
BRANCHES—HOUSTON, TEX. & PORTLAND, ORE.

Cooling Tower DOs and DON'Ts
-by MARLEY (No. 1 of a series)

COLD-WEATHER OPERATION

Trouble-free cold-weather operation can be had with modern cooling towers by proper control and maintenance of air and water temperatures within the tower. Water temperatures in all types of towers can be regulated by (a) utilizing only a portion of the tower, (b) by-passing some of the water, or (c) simply throttling the quantity.



Air flow, which affects internal air temperatures, is difficult to control in natural draft towers but is relatively simple with mechanical draft, particularly if fans have 2-speed motors.

To maintain required temperatures, any of these methods, or a combination, may be used:

1. Circulate all the water over only a portion of the tower, shutting down the remainder completely.

2. Circulate all the water over the entire tower with all fans idle or any combination with fans at high speed, low speed or idle.

3. By-pass some of the water and shut down some sections of the tower completely.

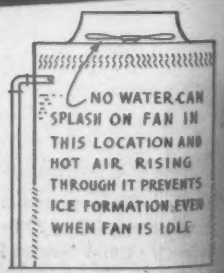
4. By-pass some of the water and circulate the rest either over the entire tower or only some sections of it, with fans variously set at full speed, low speed or idle.

Except in the case of poorly designed towers, good operating practice can avoid "icing" troubles. But should ice have to be removed, thaw it by raising air-and-water temperatures, preferably in one section at a time. If done with hot water or a steam hose, start at top and work down. Induced draft towers can be de-iced by leaving water run and (a) reversing fan rotation if motor and drive permit, or (b) stopping each fan and covering it.

MARLEY COOLING TOWERS

14-A

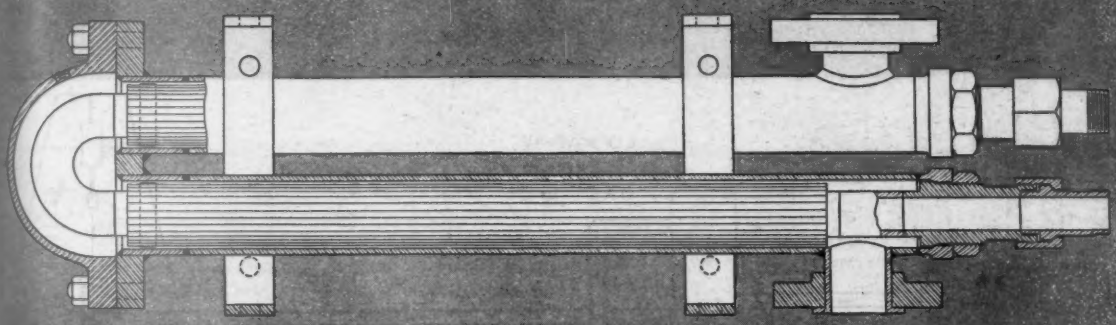
DO YOU KNOW — that Marley led in developing and advocating the induced draft tower largely because of its all-around operating advantages. Cold-weather features include: 1. Effective performance by natural draft, with fans idle. 2. Only *hot* air passes through fans, keeping them free of ice.

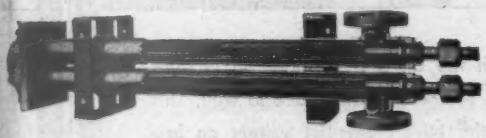


THE MARLEY COMPANY, INC. · KANSAS CITY · KANSAS

A UNIVERSAL HEAT EXCHANGER

FOR ALL HEAT TRANSFER SERVICES





THE TWIN G-FIN SECTION . . .

can be used on a greater variety of heat transfer services than any other design . . . can be easily handled without heavy rigging . . . can be applied to changes in service without changing design . . . can be supplied for pressures up to 2000 lb. in shells and 5000 lb. in elements, for temperatures up to 900 deg., for dirty liquids and fluids of low heat conductivity . . . can be furnished with elements of standard non-ferrous or ferrous materials . . . has no packed or rolled joints.

Eleven years of Twin G-Fin Section performance and the service records of more than 40,000 sections installed have PROVED the adaptability . . . dependability . . . durability . . . of this design. These standard, interchangeable units are built in a range of types and sizes for any transfer requirements, and our expanded manufacturing facilities permit speedy shipments.

Write for descriptive Bulletin No. 1613.

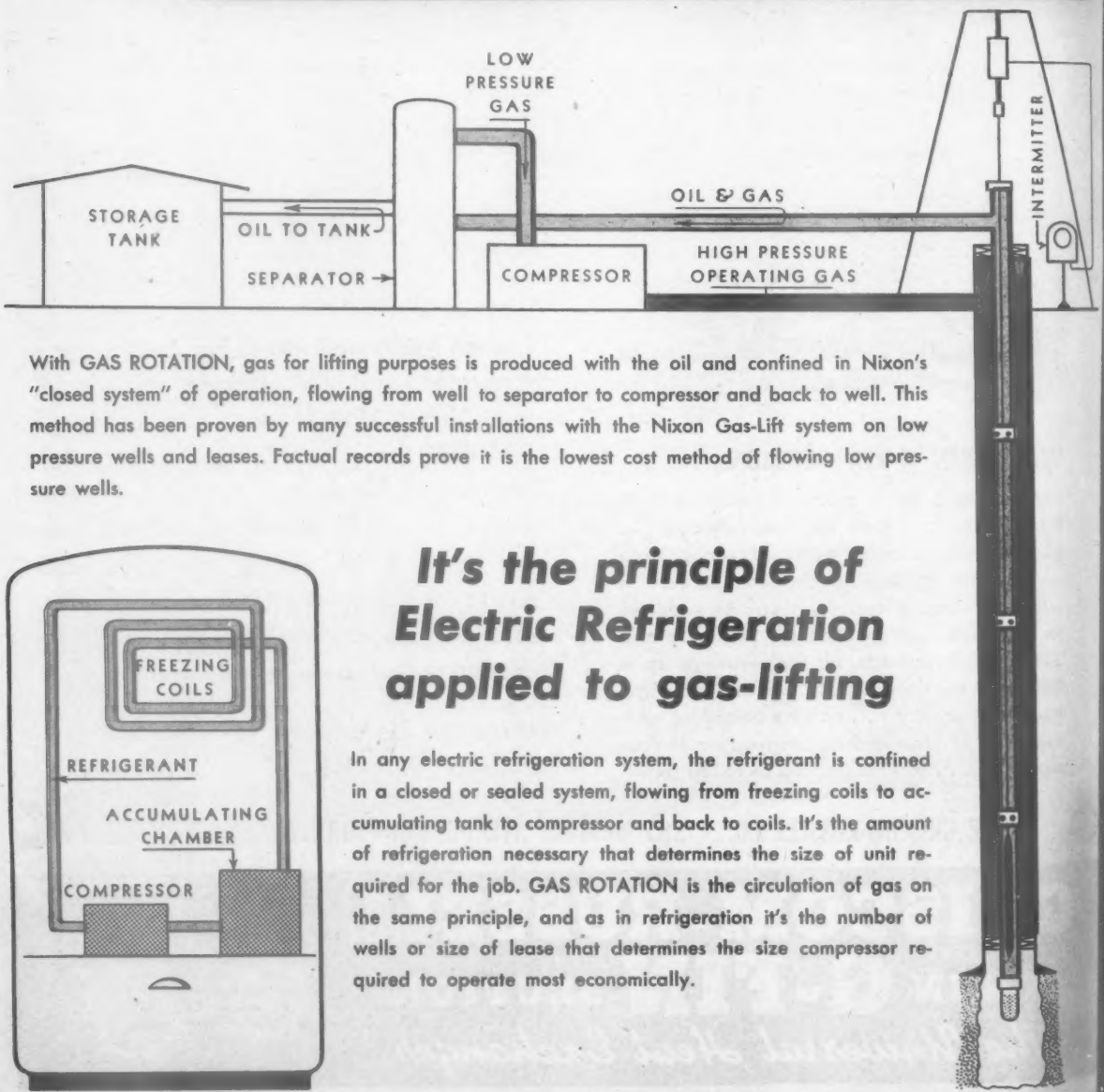
THE GRISCOM-RUSSELL CO. • 285 MADISON AVENUE, NEW YORK 17, N. Y.

GRISCOM-RUSSELL

TWIN G-FIN SECTION

The Universal Heat Exchanger

GAS Rotation



With GAS ROTATION, gas for lifting purposes is produced with the oil and confined in Nixon's "closed system" of operation, flowing from well to separator to compressor and back to well. This method has been proven by many successful installations with the Nixon Gas-Lift system on low pressure wells and leases. Factual records prove it is the lowest cost method of flowing low pressure wells.

It's the principle of Electric Refrigeration applied to gas-lifting

In any electric refrigeration system, the refrigerant is confined in a closed or sealed system, flowing from freezing coils to accumulating tank to compressor and back to coils. It's the amount of refrigeration necessary that determines the size of unit required for the job. GAS ROTATION is the circulation of gas on the same principle, and as in refrigeration it's the number of wells or size of lease that determines the size compressor required to operate most economically.

Copyright 1944, Wilson Supply Company

broadens THE ADAPTABILITY OF NIXON GAS-LIFT

Low pressure of your gas wells or lease gas system needn't cheat you of the economies made possible by producing with Nixon Surface Control Gas-Lift.

A system of Gas Rotation for low pressure wells and leases is being successfully used by 35% of all Nixon Gas-Lifts in operation. After the gas used for lifting purposes leaves the separator it is compressed and re-injected at high pressure into the casing annulus, from whence it enters the tubing to bring another column of fluid to the surface.

The highly efficient "closed system" operation of the Nixon Gas-Lift makes this application possible—meaning you can install this money-saving equipment on your low pressure wells and lift fluid cheaper than by any other means.

SMALL COMPRESSOR SUFFICIENT

No costly, heavy duty compressor unit is necessary to produce one or several wells on the same lease. A small compressor is sufficient . . . and the savings effected by the Nixon Gas-Lift quickly offset the cost of the compressor unit.

LOW GAS/OIL LIFTING RATIO

The volume of gas required for lifting fluid with Nixon Gas-Lift is smaller per barrel than with any comparable fluid-lifting system. This accounts for the fact that operating gas can be rotated and used repeatedly, even with a small compressor.

LOW INSTALLATION COST

The combined cost of Nixon Gas-Lift and Compressor equipment for Gas Rotation is less than that of any other method for producing low pressure wells. Maintenance and operating costs are extretmely low.

Ask one of our engineers to give you complete facts about lower cost production with Nixon Gas-Lift System. Write your nearest Wilson Supply Company store or sales office.

WILSON SUPPLY CO.

1412 MAURY STREET — HOUSTON

Partial view of the great butadiene and styrene plant at Kobuta, Pa., built for the Defense Plant Corporation by Koppers Company and operated for the Rubber Reserve Corporation by Koppers United Company. Vast quantities of CAREY Heat Insulation were installed in this unit.

Carey HEAT INSULATION

Installed "ON SCHEDULE" *at Giant* KOBUTA *Synthetic Rubber Plant*

Supplying and installing mile upon mile of efficient Heat Insulation for the great butadiene and styrene plant at Kobuta was a BIG job, over $1,000,000 . . . but not too big for CAREY SERVICE!

CAREY'S large production facilities, nationwide distribution service, and specially-trained engineers and erection crews of the Carey Contract Organization—ALL combined to provide adequate Heat Insulation for this immense project, with *record-breaking speed and efficiency.*

Whatever your insulation problem, remember—you can ALWAYS depend on CAREY SERVICE for high quality materials, expert and speedy installation, and utmost economy. For information on the complete line of CAREY Heat Insulations, write Dept. 34.

Conserve fuel...Increase Power...* END THE WAR *FASTER!

THE PHILIP CAREY MFG. COMPANY—Lockland, Cincinnati 15, Ohio

Dependable Products Since 1873

In Canada: **The Philip Carey Co., Ltd. Office and Factory: Lennoxville, P. Q.**

PACKAGES OF POWER

FOOTE BROS. ACTUATORS DO THE HEAVY MECHANICAL JOBS

...Actuators are ...the Lockheed ...P-38

As airplanes have increased in complexity, the job of the pilot has become more and more difficult. To free him of some of the heavy mechanical jobs, actuators have been developed which are, in effect, packages of power that perform many such jobs as opening and closing ventilators, operating wing flaps, retracting under-carriages and setting stabilizers.

These actuators are compact motor-driven units requiring gears of extreme precision. Their proved practicability on airplanes now flying points the way to greater use on planes now on drafting boards.

Because of the vast technical experience and manufacturing "know hows" acquired in producing high precision gears, gear units and actuators for the aircraft industry, Foote Bros. has developed new manufacturing methods that point the way to better "power transmission through better gears" for peacetime industry.

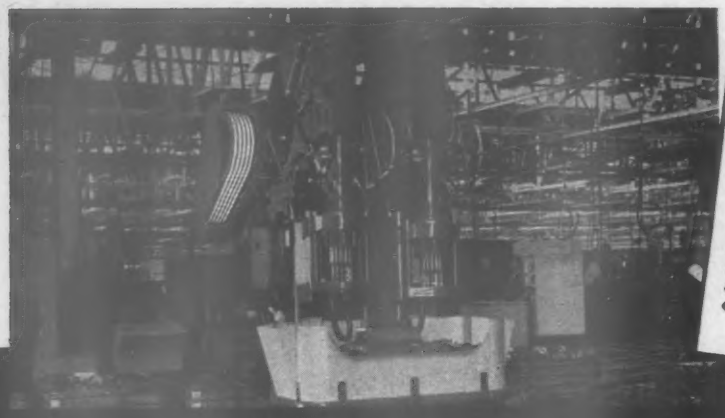
FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard • Chicago 9, Illinois

Foote Bros. Actuators are used on the Lockheed Constellation C-69

Foote Bros. Actuators are used on the Lockheed 349

FOOTE BROS.

Better Power Transmission Through Better Gears



Here, in one of the nation's leading Aircraft factories, belts on some machines were subjected to a severe oil condition. The Gates Field Engineer recommended Gates V-Belts of special synthetic rubber. Carefully kept records show that these belts are regularly wearing 3 times to 4 times as long as ANY belts of natural rubber ever used.

In This Leading Aircraft Factory . . . .

GATES Synthetic Rubber V-Belts

Your Gates Field Engineer—listed in your telephone directory—will tell you which type of Gates V-Belt best meets your special needs.

Wear *3 TIMES* as *LONG* As Any *NATURAL RUBBER* V-Belts Ever Used!

For more than *6 years,* Gates Field Engineers have been recommending and installing Gates V-Belts of special synthetic rubber wherever a severe oil or heat condition exists.

These belts have now told their service story in aircraft factories, in steel mills, in ordnance plants, in machine parts factories and many other kinds of plants all over the United States. *Everywhere,* they have completely whipped the problem of severe oil conditions. They are wearing two and three and even *four times* as long as any belts of *natural rubber* ever used.

Isn't this a convincing illustration of what you stand to gain by calling the Gates Field Engineer whenever you have the slightest trouble with any drive problem?

You may not have an oil or heat problem — yet *other* service conditions may be such that a V-belt of some special construction can most profitably be used. For example, in your particular installation, Static-Safety V-belts may best fit your special need. Again, Rayon Cord V-belts or V-belts with tension members composed of flexible steel cables may prove to be the most efficient and economical.

In any case, the wisest move you can make is to phone the Gates Field Engineer. He is thoroughly competent to analyze any drive problem. He is completely informed on the nature and advantage of every type of belt. He will always recommend the practice that will be most efficient and economical for you.

GATES V-BELTS INCLUDE:—

1. *Special* Synthetic V-Belts
2. Static-Safety V-Belts
3. Cotton Cord V-Belts
4. Rayon Cord V-Belts
5. Steel Cable V-Belts

444

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington	**NEW YORK CITY** 215-219 Fourth Avenue	**ATLANTA, GA.** 738 C & S National Bank Building	**LOS ANGELES, CAL.** 2240 East Washington Boulevard	**DENVER, COLO.** 999 South Broadway
DETROIT, MICH. 8663 Grand River Avenue	**PORTLAND, ORE.** 333 N. W. 5th Avenue	**DALLAS, TEXAS** 2213 Griffin Street	**SAN FRANCISCO, CAL.** 1090 Bryant Street	

HOW YOU CAN GET ADDED REFINING CAPACITY

WITHOUT ALTERING YOUR PRESENT PLANT!

The answer is almost too simple. It is to use efficiently the potential throughput capacity *of your present equipment*, by desalting the crude charge.

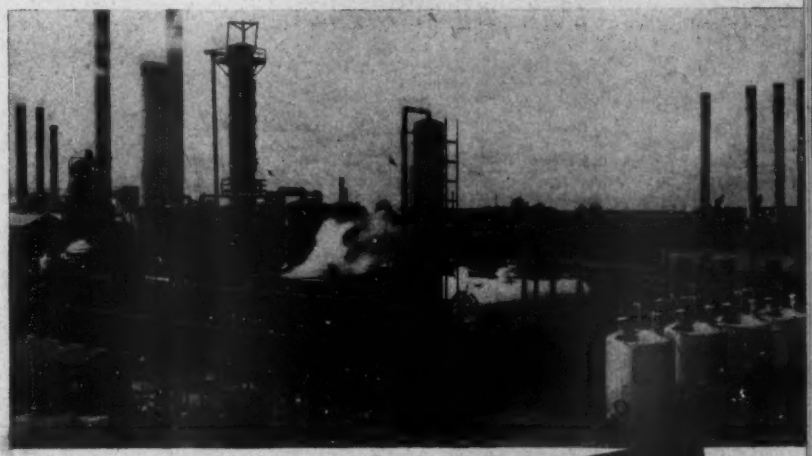
This is not a theoretical answer. Actual experience in numerous refineries using Petreco Desalters has proven that production capacities can be substantially increased.

Increased throughput is accomplished in two ways. First, in keeping refining units from plugging and scaling as runs progress, the potential capacity is more fully utilized. Second, by preventing the deposition of hard coke and salt accumulations, on steam time is appreciably extended. Here are several actual examples.

In a Michigan refinery, a Petreco Desalter jumped the topping throughput from 2,300 to 2,500 barrels, at the same time stretching 10 day runs to over two months.

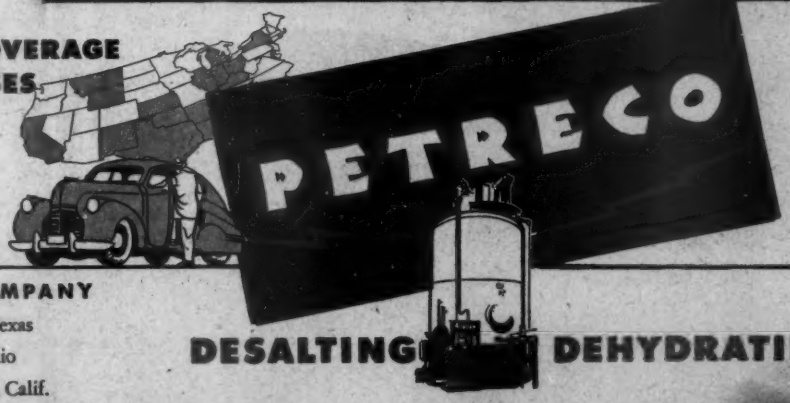
A Kansas refiner added 500 barrels per day to its throughput and stepped up running time from irregular two and three day periods to more than 70 days.

A refinery in Illinois increased the daily charge from 3,500 to 4,000 barrels. Shut-downs due to salt troubles were completely eliminated.



COMPLETE OIL STATE COVERAGE WITH PETRECO PROCESSES

A Petreco representative will call and give you further particulars on the savings you can obtain by using Petreco Desalters. Such a visit will not obligate you in any way.

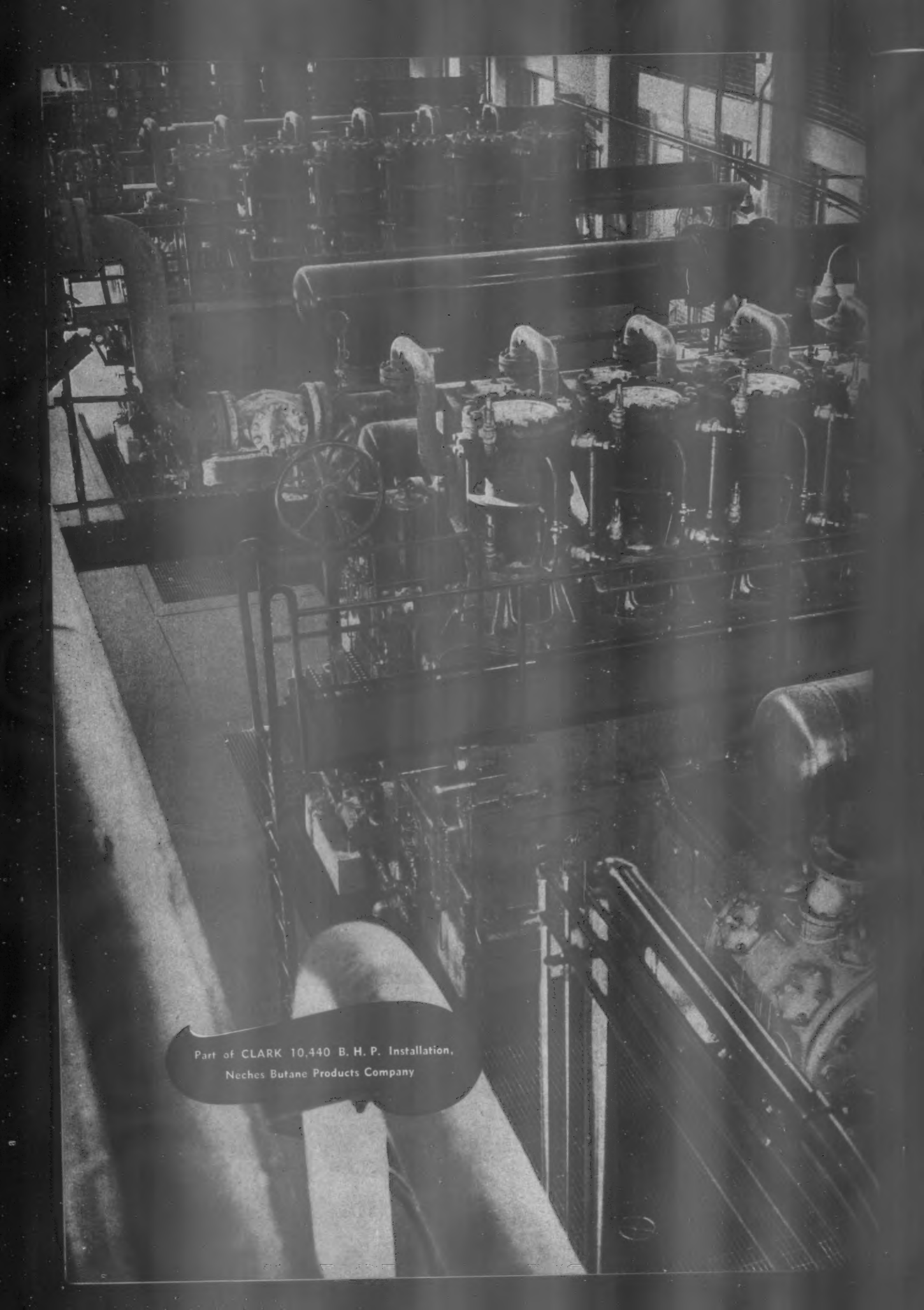


PETROLEUM RECTIFYING COMPANY

5121 So. Wayside Dr., Houston 1, Texas
648 Edison Building, Toledo 4, Ohio
530 West Sixth Street, Los Angeles 14, Calif.

Representatives in principal production and refining centers

DESALTING DEHYDRATING



Part of CLARK 10,440 B. H. P. Installation,
Neches Butane Products Company

They're glad h

NATIONAL SEAMLESS LINE PIPE is working "round-the-clock" in carrying fuel to manufacturing centers and to distribution points for our fighting fronts. It is establishing enviable records for performance under stepped-up schedules of wartime demands.

"ON STREAM" LONGER. Refineries using NATIONAL Seamless Alloy Steel Tubing are keeping "on stream" longer to meet the peak demands of high-pressure, high-temperature operation in the manufacturing of high octane gasoline and synthetic rubber.

NATIONAL SEAMLESS Drill Pipe, Casing and Tubing are giving "yeoman's service" in America's great oil fields to furnish the unprecedented demands of War to keep the moving parts of mechanized equipment rolling and planes flying.

hey used Seamless

THE war has made it necessary to get the utmost use out of oil field and refinery equipment. Drillers have been forced to conserve the limited strings available. Casing in old wells has been pulled and used over again. Even complete pipe lines have been dug up and laid down again in more important locations.

All this hard use and re-use of pipe and tubing has focused attention on how all-important is the matter of giving the utmost care and deliberation to "overall" or, "in the long run," economy in the selection of materials.

NATIONAL Seamless is piling up some amazing records. Old customers have told us again and again they are glad they used seamless because of the punishment it can take in these emergency conditions.

In heavy-worked refineries too, NATIONAL Seamless is backing up the judgment of those responsible for its selection. Production has been maintained at peak capacities with a minimum amount of time lost for "off-stream".

When conditions ease up and more pipe, casing, and tubing become available, remember why these long-time users are glad they used Seamless.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

United States Steel Export Company, New York

USS

NATIONAL SEAMLESS

BULLETIN BOARD

Steel needs more scrap NOW

Winter months slow down the flow of scrap but the demand for steel is greater than ever. Keep your scrap moving.

One Aim · VICTORY · Buy Bonds

NEW MOVIE FILM AVAILABLE

The new United States Steel film on war production, "To Each Other" is now being shown in theaters throughout the country. It will be available soon for showing to your employees, club members, and other private groups. Write for full information.

UNITED STATES STEEL

Now Ready...

A Bigger Plant

A Bigger Reservoir of Skill

All discussion of post-war planning makes one fact sharply clear. The world-wide call for Diesel power after hostilities cease will be tremendous —for new enterprises, for rebuilding and because of obsolescence.

The Busch-Sulzer organization will be well equipped to play its part in the world rebuilding program. Since America entered the war our facilities have been greatly expanded and, within the last 18 months, our trained personnel has been increased by 50 percent.

At present we are working 'round the clock on Navy ammunition hoists, Diesel engines for minesweepers, net tenders, ocean-going tugs, U. S. Maritime Commission ocean-going cargo ships and smaller vessels and stationary engines for high priorities only.

When the war is won, work can begin at once upon peacetime projects without long delays for retooling or training. Busch-Sulzer Diesel engines, in unit sizes from 450 BHP upwards, offer a wide range of speeds for different classes of service or drive. They are noted for their low fuel consumption, reliability and long life.

BUSCH-SULZER
ST. LOUIS

BUSCH-SULZER BROS.-DIESEL ENGINE COMPANY
SAINT LOUIS

AMERICA'S OLDEST BUILDER OF DIESEL ENGINES

B&W *makes* BOTH

Tubing problems and tubing purchases can be simplified for refinery engineers by dealing with B&W. This is true whatever the tubing need . . . seamless or welded . . . because B&W MAKES BOTH . . . in modern well equipped specialty tube mills where each inquiry or order receives individual attention.

There is a B&W Tube for practically any refinery requirement. If you're not certain which type of tubing is best suited for your refinery requirements, B&W offers you helpful unbiased technical advice . . . centralizes your tube engineering and purchasing problems . . . important facts to remember in judging the impartiality of tube recommendations.

THE BABCOCK & WILCOX TUBE CO.

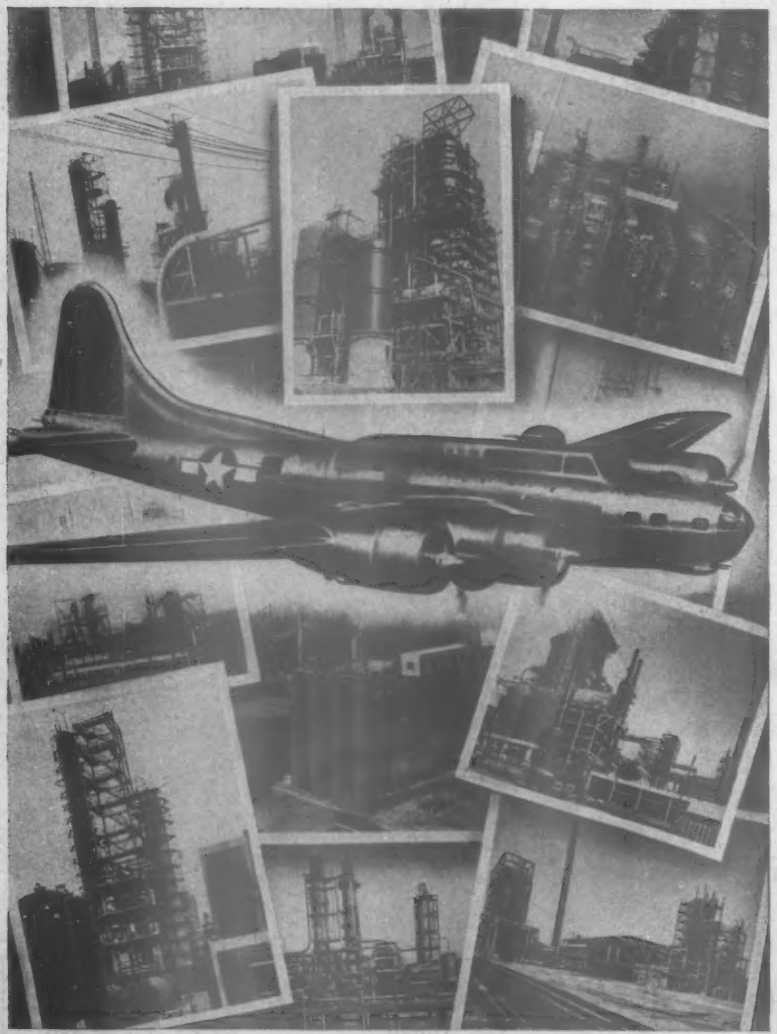
SEAMLESS TUBE DIVISION
BEAVER FALLS, PA.

WELDED TUBE DIVISION
ALLIANCE, OHIO

TA-1284

Team-work job gives allied air-fighters big edge

A tribute to the thousands of patriotic workers who have built and are manning our aviation gasoline plants.



● TWO YEARS AGO the armed forces called on the petroleum industry to increase production of 100-octane aviation gasoline to fuel the world's mightiest air force then in the making. It was no easy task. It meant building more than a hundred great new units, converting many old ones.

Thanks to the scientists, engineers, builders, and workers, the job is nearly done. Production will soon be more than ten times what it was when we went to war. A great stream of the dynamic stuff which gives our airmen the edge over their enemies is already flowing to the battle fronts. Adolf and Tojo will never be able to match it.

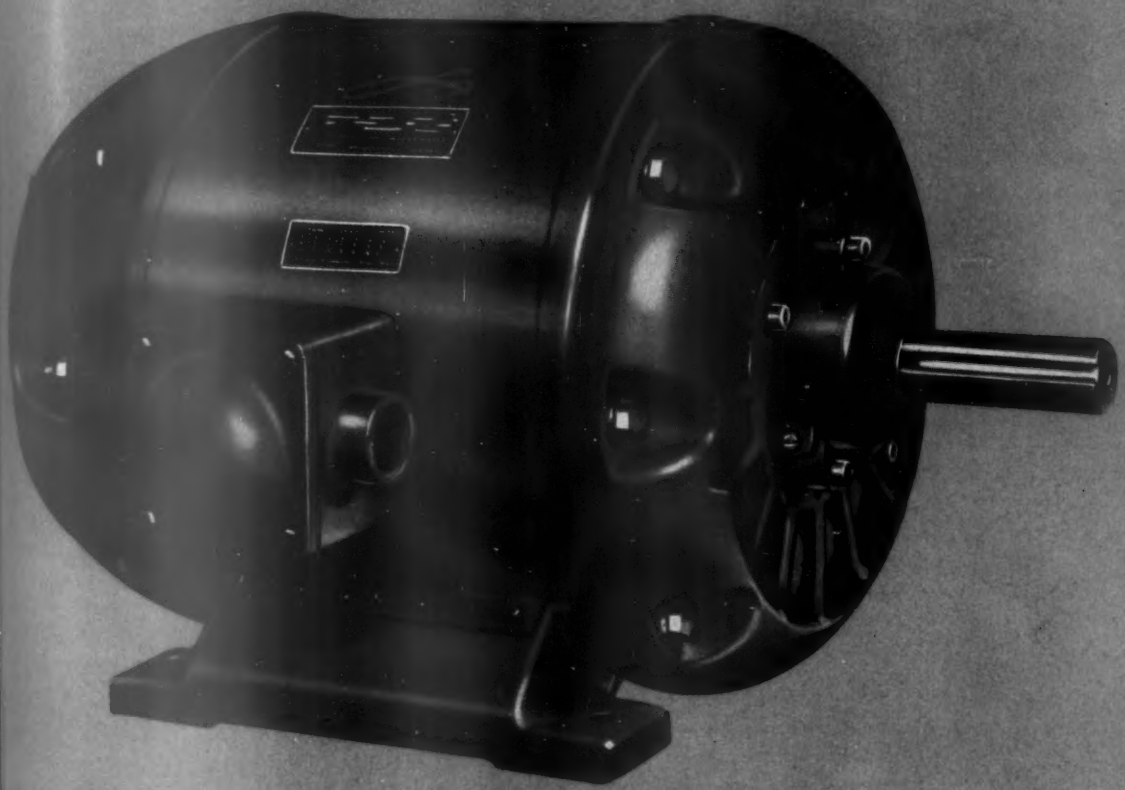
To Standard of Indiana and its subsidiaries was assigned a major role in this great program. We take off our hats to the thousands of construction workers who turned blueprints into operating units, to the process workers who today are bringing production up to the point that our plants alone will soon be making *enough 100-octane gasoline to power a 1000-bomber raid on Berlin every other day.*

The men responsible for this achievement can have the satisfaction of knowing it is one of the important steps in America's war production program—destined to be one of the deciding factors in the final victory.

Oil is Ammunition . . . Use it Wisely. Buy more War Bonds.

STANDARD SERVICE

STANDARD OIL COMPANY (INDIANA)



There is a size and type **LOUIS ALLIS** *electric motor for every industrial requirement.*

THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.

Your Electric Motor Requirements

The day of trying to use a standard motor for a special job is about over.

Machinery designers, and production managers have learned that it is much more efficient and economical to obtain a motor with exactly the electrical and mechanical characteristics required to perform a specific job than it is to try to doctor up a standard "shelf" motor to do the job.

Speed and horsepower are no longer the major measuring stick of motor requirements—they are merely incidental to the many other characteristics available in electric motors today.

For over forty years we have been developing special motors for special jobs—our engineering department has a wealth of experience along this line—

* * *

Our engineering development department has created many outstanding — perhaps revolutionary — improvements in electric motor design, construction and performance that are now playing an important role in helping win this war.

Many of these important new motor developments will also play an important role in the post-war period.

Our engineering development department will welcome the opportunity of discussing your post-war electric motor problems with you.

THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.

AT TEMPERATURES TO 1100°F.

DM IS THE PROPERLY BALANCED ALLOY STEEL

IN numerous cases, Timken Seamless Tubes made of DM Steel have been the answer to problems in high pressure piping, cracking still tubes and heat exchanger tubes.

DM is a properly balanced alloy steel for service at elevated temperatures where corrosion is not severe. It contains the right proportions of chromium, molybdenum and silicon for maximum load carrying ability up to 1100°F. Yet these elements have been kept within such limits that excellent weldability has been maintained.

Before you make replacements consider Timken Seamless Tubes of DM Steel. Take advantage of their load carrying ability, resistance to oxidation, corrosion resistance, good weldability, freedom from pronounced air hardening, and moderate cost.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
SEAMLESS STEEL TUBES

Complete data on this and other high temperature steels are available on request. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

Only "Varec" Vent Valves give you all these SPECIFIC Features

Cutaway section of "VAREC" approved Conservation Vent Valve. Fully streamlined, with Hyperbolic pallets, this valve vents tanks with minimum vapor loss. Equipped with inside flame snuffer.

Installation photo of "VAREC" approved Conservation Vent Unit.

- **HYPERBOLIC STATIC-BALANCED PALLETS** insure less "blow-down."
- **PALLET GUIDES** are not exposed to corrosive tank vapor.
- **GREATER FLOW CAPACITY.** Expanding streamlined passageways eliminate directional changes and eddying currents.
- **WIND DRIFT** is eliminated by scientific design.
- **INSIDE FLAME SNUFFER** acts directly on the pressure pallet.
- **NONCORROSIVE AND NONELECTROLYTIC ACTION.** Materials are used having best thermal, electrical potential, and noncorrosive factors in combination.
- **GREATER DURABILITY.** Materials and design insure longer life.
- **REPLACEABLE SEATS** guarantee minimum maintenance expense.
- **FIELD PRE-TEST.** All "VAREC" equipment is pre-tested to actual field installations.
- **FOOL PROOF.** Pallet guiding system positively prevents binding or freezing.
- **NONFREEZING.** Drainage throughout the unit is complete—no condensate can accumulate.
- **WEATHERPROOF.** Properly protected against all kinds of weather, mud-dobbers, birds, etc.
- **TWENTY YEARS EXPERIENCE** is built into every unit.

THE PACE SETTER

THE SAFE venting of tanks, with minimum vapor loss and the least maintenance, is the job this valve performs, 24 hours a day, year in and year out. The efficiency and economy of thousands of installations throughout the world plus years of research, have made "VAREC" approved Tank Equipment, The Pace Setter Since 1928.

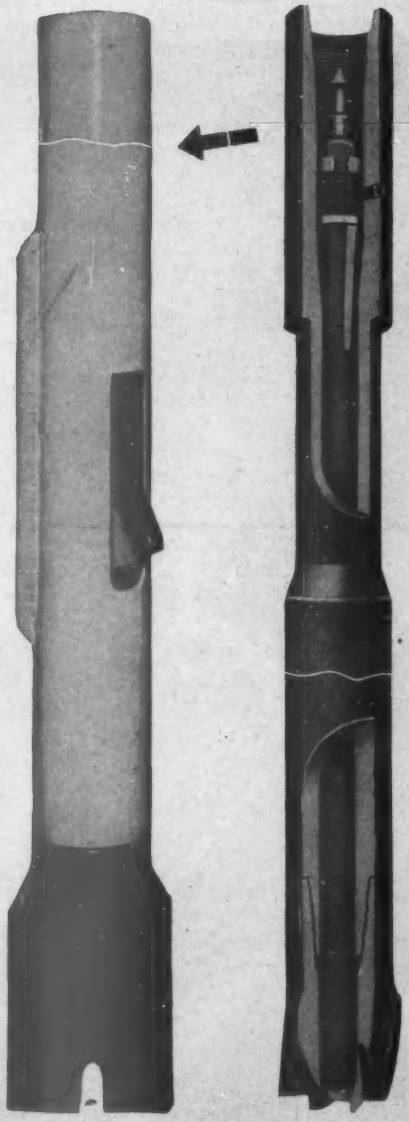
In full cooperation with the war effort in conserving critical materials, "VAREC" Conservation Vent Units are available of semisteel in all sizes. Trim may be had in bronze or aluminum, Bakelite, or other nonmetallic materials.

THE VAPOR RECOVERY SYSTEMS COMPANY
Compton, California

Branch Offices and Stocks Carried at
New York City • New Orleans, La. • Houston, Texas • Tulsa, Okla.
Agencies Everywhere

CORES

from SIDE WALL *or* BOTTOM HOLE



By HUNT'S Modern Wire Line Method

The Hunt Side Wall Coring Tool recovers real cores from the side wall of the hole . . . cores large enough to be easily and quickly analyzed by leading laboratories. After drilling to a predetermined depth, the well may be electrically logged for all possible producing formations . . . then side wall cored, quickly and at low cost with the wire line retractable barrel.

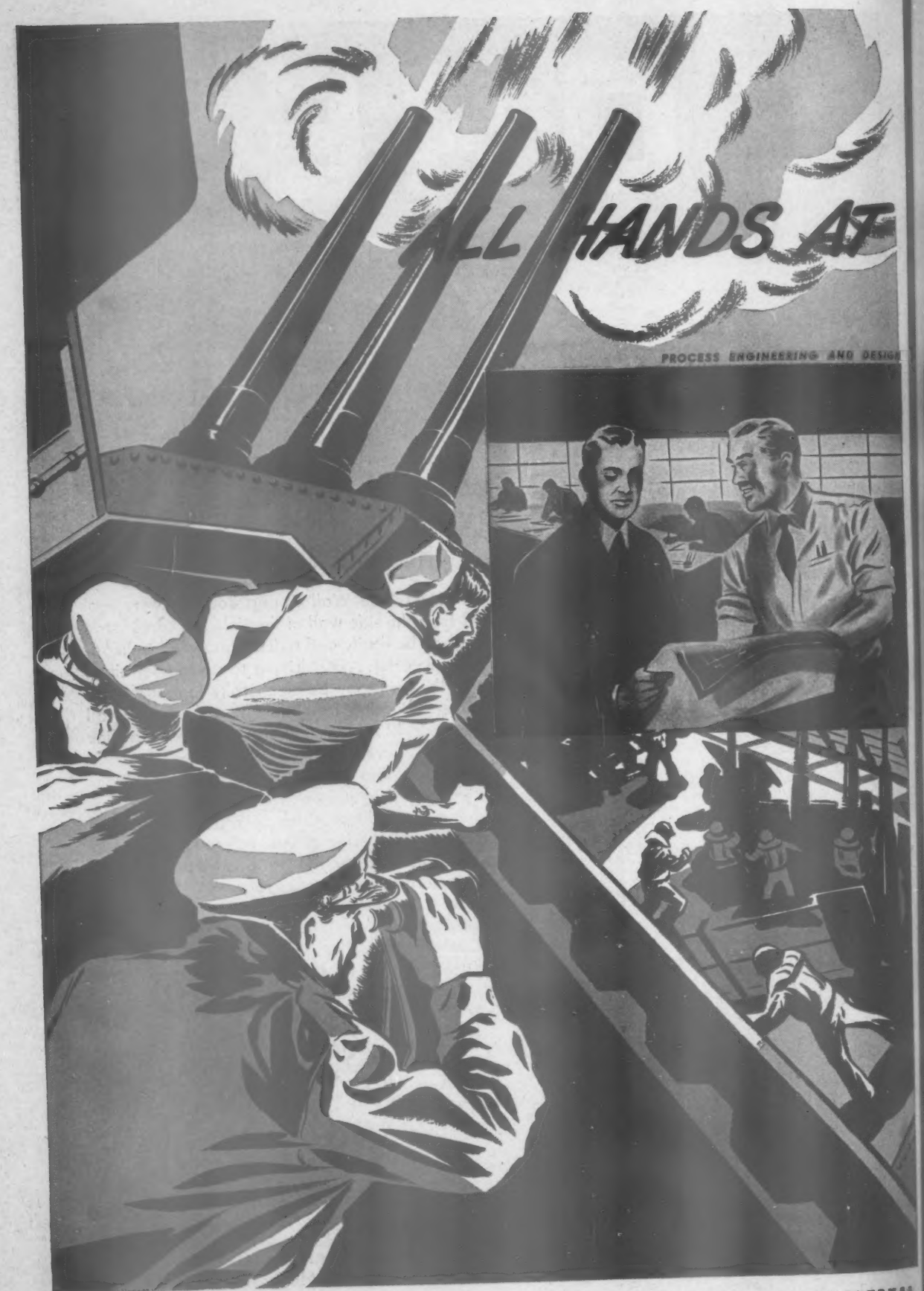
The Hunt Wire Line Barrel gives you a higher percentage of recovery, with minimum contamination of cores. It provides drilling efficiency and speed between coring points, not requiring a trip out of the hole to change from core bit to regular bit. Numerous advantages over other methods have won its worldwide acceptance among leading operators.

Get the facts . . . detailed description and specifications . . . on these two better tools from your Composite Catalog.

HUNT TOOL COMPANY

HUNT TOOL COMPANY, Houston, Texas, U.S.A.

SHOPS: Houston, Bay City, Corpus Christi, Jennings, Harvey
EXPORT: W-K-M Company, Inc., 74 Trinity Place, New York City


ALL HANDS AT
PROCESS ENGINEERING AND DESIGN

BATTLE STATIONS!

PROCUREMENT AND CONSTRUCTION

INITIAL PLANT OPERATION

War is still America's most serious business of the moment. Industrial efficiency is high—but not high enough. Production is huge—but still short of goals. Both objectives demand the redoubled effort of every loyal individual and concern.

BADGER is knee-and-elbow-deep in the kind of large-scale work for which Badger's long experience is particularly suited. Since Pearl Harbor—and before—Badger services have been heavily engaged in process engineering, design and construction for both Government and private war-production plants in the petroleum, petro-chemical and chemical fields.

The total number of Badger employees engaged on war projects to date would populate a small city. The many construction operations in which Badger has had an important part during the past three years extend through many states and foreign countries. They represent a value approximating the cost of several "Alcan" highways.

Conspicuous are plants for the manufacture of butadiene, alcohol, toluol, tri-nitro-toluene, plus many complete refineries for the production of aviation gasoline.

Badger is thoroughly equipped and manned to assume full responsibility for the complete handling of any size project, from inception to final test-run operation. Around the key personnel of Badger's central organization are technical and laboratory engineers; design engineers and draftsmen; procurement, expediting and accounting experts; seasoned and efficiently supervised construction crews; experienced plant operators.

All these combine to afford the many advantages to be gained from placing everything in the hands of one qualified concern working in close co-operation with your own organization.

Process Engineers and Constructors for the Petroleum, Petro-Chemical and Chemical Industries.

◊ Licensing Agents for the Houdry Catalytic Cracking Processes; All-purpose Fixed Bed Units, Adiabatic Fixed Bed Units, Thermofor Units.

E. B. Badger & SONS CO.

BOSTON **EST. 1841**

New York • Philadelphia • San Francisco • London

BADGER HAS DESIGNED AND BUILT MORE CATALYTIC CRACKING UNITS THAN ANY OTHER ORGANIZATION IN THE WORLD

ENSIGN CARBURETORS ARE *Backing the Attack!*

ENSIGN Carburetion Equipment, at work for our armed forces, is playing an important part in the grim fight for Victory. Supplying this equipment is ENSIGN'S major task for the duration.

But there is a home front which is "backing the attack"—and here, too, ENSIGN Carburetion Equipment is helping in the vital work of supplying food, transportation, oil and many other necessities.

The amount of ENSIGN Carburetion Equipment available for non-military work is necessarily limited, but replacement parts can be furnished without delay.

For the BEST in Carburetion—insist on ENSIGN.

Prepare NOW for post-war demands. Our competent engineering staff is at your service.

ENSIGN CARBURETOR CO., Ltd.

HUNTINGTON PARK • CALIFORNIA

Smooth Up Your Flame-Cut Shapes QUICKLY!

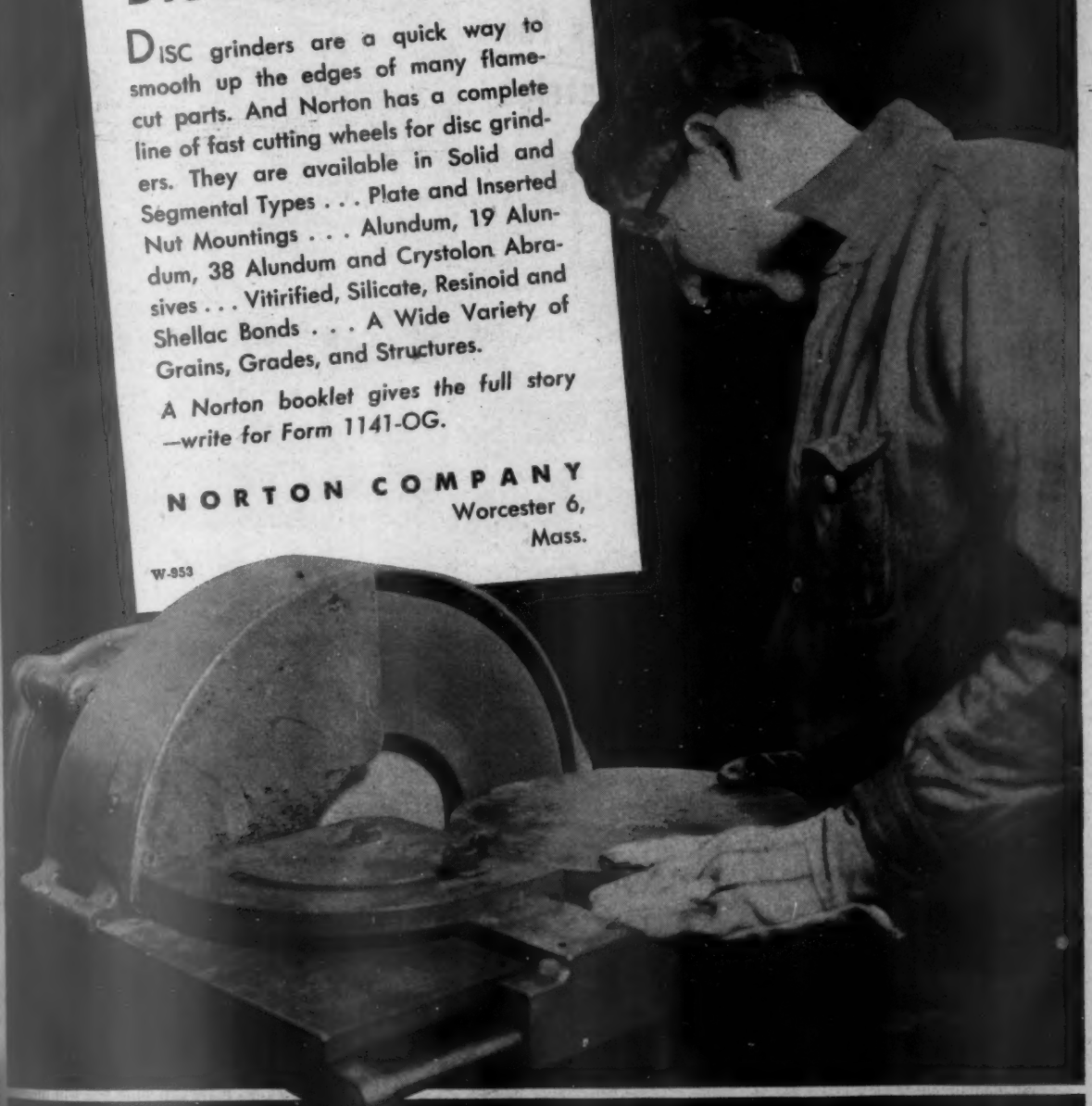
. . . with NORTON DISC WHEELS

DISC grinders are a quick way to smooth up the edges of many flame-cut parts. And Norton has a complete line of fast cutting wheels for disc grinders. They are available in Solid and Segmental Types . . . Plate and Inserted Nut Mountings . . . Alundum, 19 Alundum, 38 Alundum and Crystolon Abrasives . . . Vitirified, Silicate, Resinoid and Shellac Bonds . . . A Wide Variety of Grains, Grades, and Structures.

A Norton booklet gives the full story —write for Form 1141-OG.

NORTON COMPANY
Worcester 6, Mass.

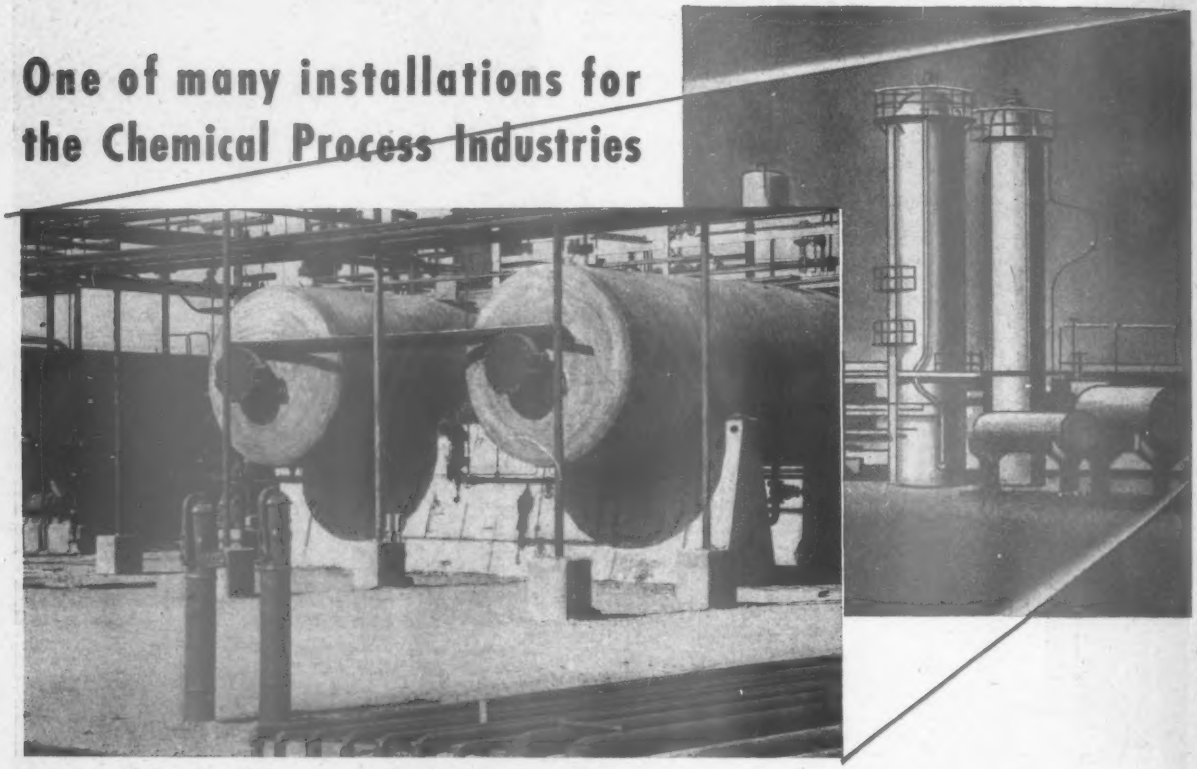
W-953



NORTON ABRASIVES

Tanks
for a Butadiene plant

One of many installations for the Chemical Process Industries



Twin tanks fabricated for a new butadiene plant

Standard Steel Corporation's Refinery Division is well set up to handle a wide range of plate steel fabrication work. The tanks shown are a typical example of relatively small equipment recently turned out. Large fractionating towers, bubble towers, absorption columns, in fact, all fabricated plate steel equipment can and is being constructed at our plant.

This plant's complete facilities are ready to be put to work for you. Standard's engineers and designers are experienced in designing special equipment—in working out tough problems. They will be glad to work with you. Write today for detailed information on Standard Steel's service.

All equipment is built to ASME and API-ASME code requirements

SOUND ENGINEERING...PROVED PERFORMANCE

STANDARD
STEEL CORPORATION

General Offices and Plant: 5001 South Boyle Avenue
Los Angeles 11, California

3 REASONS WHY

Mac Clatchie Liners are "Money-Savers"

MacClatchie "Money-Saver" Pump Liners are manufactured under an exclusive process that enables you to save money on long, trouble-free wear . . . on replacement . . . and on shipping costs. Every liner must pass a rigid test covering the entire inner surface, which test reveals any soft spots that would cause breakdown and premature wear. Consequently, "Money-Savers" will boost your slush pump efficiency and bring you greater all-around savings than you have ever had before.

HERE'S WHERE YOU SAVE with MacCLATCHIE LINERS

"Money-Savers"

ARE LIGHT IN WEIGHT

The patented process by which these liners are made produces a tough, long-wearing liner with *all* dead weight eliminated, thus greatly reducing shipping costs to distant fields. In some instances "Money-Savers" are as much as *64 pounds lighter* than others of the same size. This often results in savings of several hundred dollars on foreign shipments.

"Money-Savers"

INSURE LONGER LIFE

Actual field tests by independent operators have proven that these liners consistently outwear other costlier makes. Made from specially selected seamless steel tubing and hardened and ground to a uniform mirror-like finish, "Money-Savers" have no soft spots to wash out or cause pitting. They not only are 100% hard, but MacClatchie's overall testing method insures absolute uniformity over the entire surface. That's why they give you longer wear and greater operating economy at lower unit cost!

"Money-Savers"

ARE QUICKLY REPLACED

The wear-free glands can be instantly slipped off the old liner and placed on the new one, effecting additional savings because you *buy only the liner itself when renewing*

"Money-Savers." This saves not only replacement cost, but on shipping costs, too!

Next time you "rig up" your slush pumps, install "Money-Savers." They're made for all sizes and makes of pumps, in either the Master or Reduced type. There are more MacClatchie liners used than any other make. Quality is responsible!

MacCLATCHIE MANUFACTURING COMPANY

COMPTON, CALIFORNIA

Mid-Continent Distributor: HAKE TOOL COMPANY, Houston, Texas - Rocky Mountain Representative: MOUNTAIN SALES & SERVICE Co., Casper, Wyo. - Foreign: GEORGE R. WOODS, 17 Battery Place, New York City

Is the Patterson-Ballagh Pipe Wiper good?

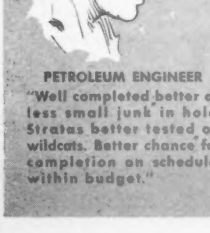
These Men Say Yes!

DRILLER
"Men work better, less fishing jobs, less blowouts. Make better showing on job."

ROUGHNECK
"Hands and feet dry. Work on dry floors. Clean pipe. Slips grip pipe in freezing weather."

DERRICK MAN
"Drill pipe is dry. Elevators easy to latch. Mud doesn't bother me. Job safer."

TOOL PUSHER
"Less mud weight material to handle. Men quit less. Less stuck drill pipe. Less worry about water supply."



PETROLEUM ENGINEER
"Well completed better as less small junk in hole. Stratas better tested on wildcats. Better chance for completion on schedule, within budget."

Reports from domestic as well as from overseas operations bring astonishing testimonials of the job Patterson-Ballagh Pipe Wipers are doing in service. Now made of PBX artificial rubber, these wipers are oil, gas and weather-resistant. The synthetic rubber, of special formula developed by Patterson-Ballagh engineers, has the essential "snap." It grips the pipe and experience in the field indicates very satisfactory wearing quality.

Users report savings that are unbelievable. They have declared that the saving of one fishing job has paid for the Wipers used for years to come. For example, one user tells us of a fishing job saved that will pay for Pipe Wipers for his wells for the rest of his life.

If you are not now using these Wipers, it certainly will be to your advantage to investigate. Made in all sizes, no tools needed to install.

See Composite Catalog

PATTERSON-BALLAGH
Los Angeles 1 • Houston 10 • New York City 6

PATTERSON-BALLAGH

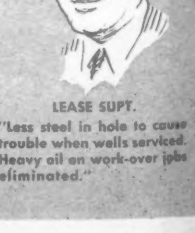
PIPE WIPERS

SAFETY ENGINEER
"Less danger from slippery floors, infected hands and fire."

DRILLING SUPT.
"Better working conditions. Less well trouble, means better showing for me."

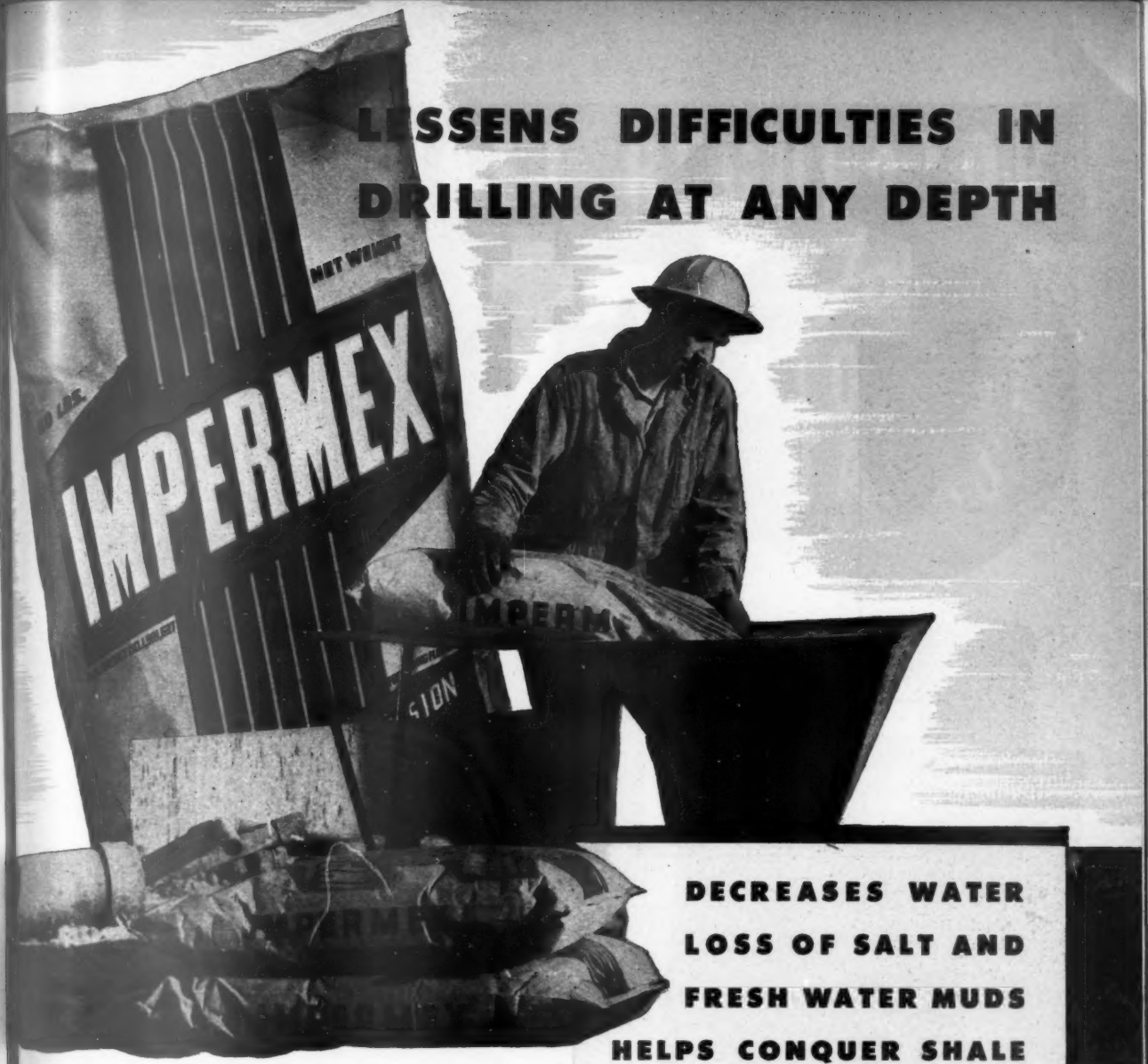
GEOLOGIST
"With no wash water, can tell more accurately absorption of stratas passed through."

PURCHASING AGENT
"Less rush orders for fishing tools, less mud weight material to buy. Cost reduced."



LEASE SUPT.
"Less steel in hole to cause trouble when wells serviced. Heavy oil on work-over jobs eliminated."

LESSENS DIFFICULTIES IN DRILLING AT ANY DEPTH



DECREASES WATER LOSS OF SALT AND FRESH WATER MUDS

HELPS CONQUER SHALE AND OTHER CAVING FORMATIONS — LOWERS WATER LOSS TO OIL SANDS

IMPERMEX solves many drilling troubles in both deep and shallow wells. It greatly decreases the water loss of drilling muds, whether fresh water or contaminated with salt or salt water, and assures a thin filter cake in either case. IMPERMEX mud is advantageous when drilling into oil sands, as the permeability is not impaired by the intrusion of water.

Shale and other caving formations give less trouble with IMPERMEX and BAROID in the mud because this combination provides very low water loss with whatever weight is required.

IMPERMEX is easily added directly to the mud. Lessened drilling difficulties make it economical to use.

Patent Licenses, unrestricted as to sources of supply of materials, but on royalty bases, will be granted to responsible oil companies and operators to practice inventions of any and / or all of United States Patents Numbers 1,807,082; 1,991,637; 2,041,086; 2,044,758; 2,064,936; 2,094,316; 2,119,829; 2,214,366; 2,294,877; 2,304,256 and further improvements thereof. Applications for Licenses should be made to Los Angeles office.

BAROID SALES DIVISION

NATIONAL LEAD COMPANY Baroid Sales Offices: Los Angeles 12 • Tulsa 3 • Houston 2

Baroid Products: Baroid and Colox • Aquagel • Fibrotex • Baroco • Stabilite • Aquagel-Cement • Smentox Impermex • Zeogel • Micatex • Anhydrox • Testing Equipment • Baroid Well Logging Service

Anhydrous

HF

At our Easton, Penna. works, then the Sterling Products Company, this new and increasingly useful chemical servant was first produced in commercial quantities. During 1931-32 nearly a million pounds were shipped from this plant to the first industrial consumer.

In keeping with increased demands of the petroleum industry, Penn Salt has expanded its facilities for producing Anhydrous HF to the point where it is now the largest AHF producer. And the skill and experience of these pioneer producers of Anhydrous HF are at your service. Let our technical staff help you with problems concerning its use . . . without obligation on your part. An intensely practical comprehensive Anhydrous HF pamphlet is available for interested technical people. Write for your copy.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

CHEMISTRY IS THE KEYSTONE OF INDUSTRY

GAS BLANKET REGULATOR

For STORAGE TANKS

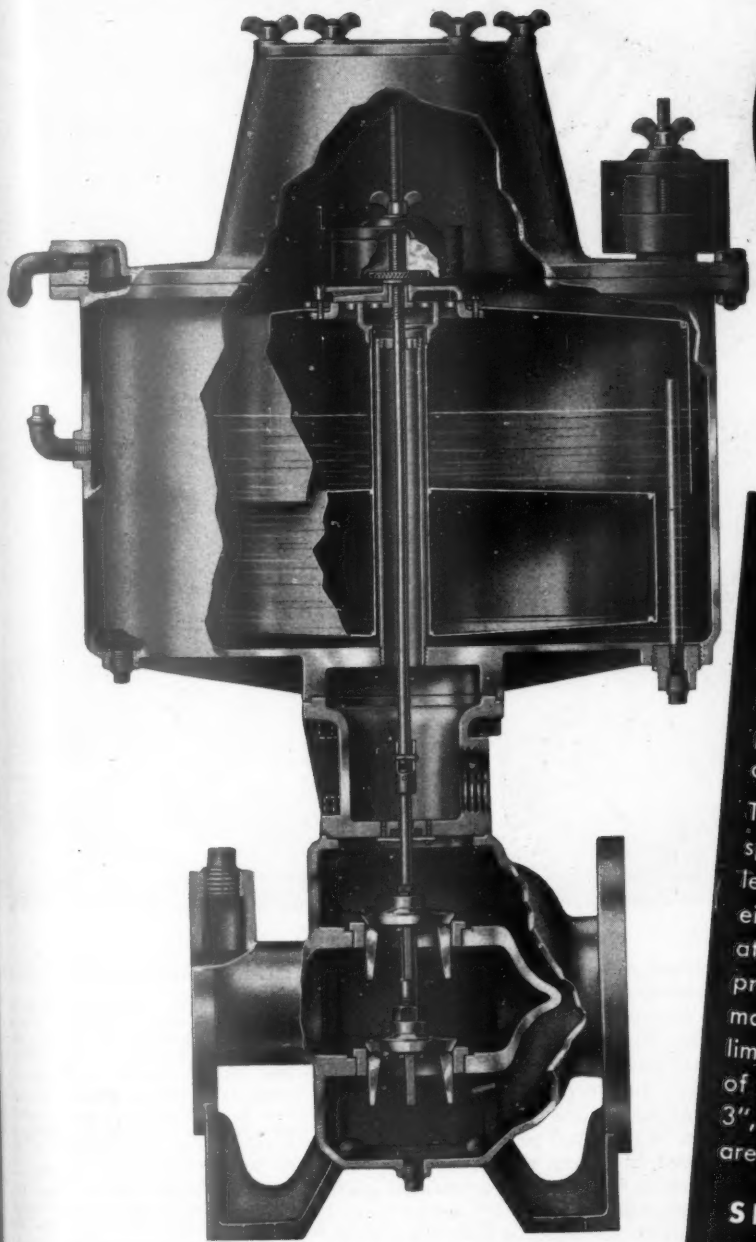


Fig. ST-772

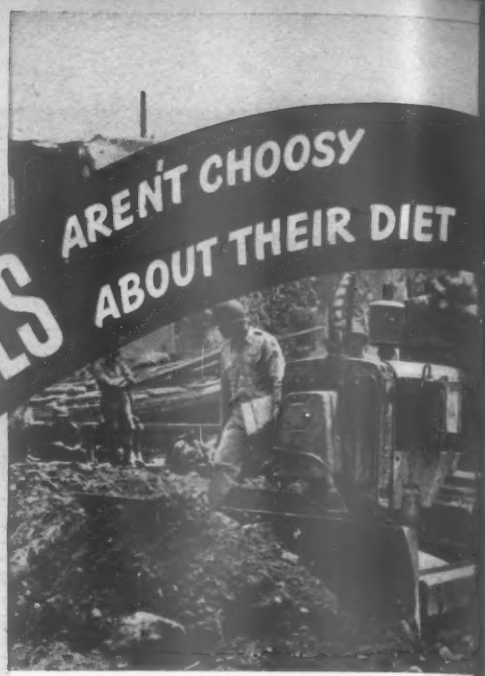
The S. & J. Supersensitive Gas Regulator is particularly adaptable to repressuring storage tanks from gas lines and giving very close control of the gas blanket maintained above the liquid level of some of the new products developed by the petrochemical industry.

This regulator operates with hair-spring sensitivity within a range of less than 1/10" to 2" of water . . . on either pressure or vacuum. Its operation is positive and exact at the pressure at which set. One regulator may serve a battery of tanks, the limitations being merely the volume of gas to be handled. Made in 2", 3", 4", 6", and 8" sizes. ☆ Inquiries are invited.

SHAND & JURS CO.
BERKELEY, CALIFORNIA
New York Chicago Houston Los Angeles Seattle

SHAND & JURS

"CATERPILLAR" DIESELS AREN'T CHOOSY ABOUT THEIR DIET



A "Caterpillar" Diesel Engine has a digestion like an Army mule. It's ready to do a cheerful day's work on any kind of fuel you feed it—and mighty little of that!

The "Caterpillar" fuel injection system is the only one of its kind in the world. Designed and built by "Caterpillar," it's extraordinarily simple, yet machined with watch-like precision.

That's why you don't have to worry about fuel. A "Caterpillar" Diesel will burn anything from cleaned crude oil to gasoline without adjustment.

The "Caterpillar" Diesel fuel system is completely protected from dust and grit, and it needs no operating adjustments whatever. When service is necessary, your "Caterpillar" dealer has factory-trained men, parts and special tools to make servicing quick, easy and inexpensive.

Simplicity, power and long life explain why "Caterpillar" Diesel equipment is the overwhelming choice of men who use heavy-duty machines.

As long as the war lasts, the bulk of new "Caterpillar" production goes to the armed forces, and the remainder is allocated by WPB among war-essential users. Meanwhile, "Caterpillar" dealers everywhere are keeping older machines in shape to carry the load at home. But a day will come when our hugely increased output can be swung back to peacetime work. And those new "Caterpillar" Diesels will be worth waiting for!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

THE "FIGHTING FOUR"

INSPECT. Look your equipment over fr quently. For expert "internal" inspecti of operating parts or functions, call in trained "Caterpillar" service man. Re your Operator's Instruction Book.

LUBRICATE. Use the right oil at the rig time in the right place and in the rig quantity. Keep the oil clean—change bef it becomes dirty and deteriorated. Follo the Operator's Instruction Book.

ADJUST. Tighten all bolts. Keep fan b and tracks at proper tension. Read t Operator's Instruction Book. For fuel i jection valves and other precision adju ments, let your experienced service-dea do the work. He'll do it well.

REPLACE. Have your service-dealer r place or repair worn bearings, track rolle pins and bushings, sprockets, cylinder li ers, clutch linings. His service helps rest power and extend equipment life. Sa critical materials, too.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS

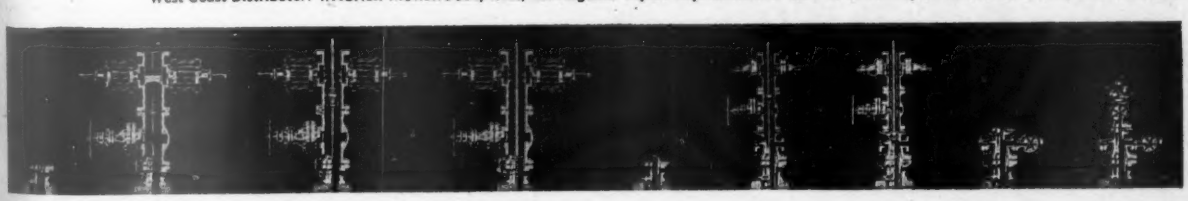
THE WHOLE IS GREATER THAN ANY OF ITS PARTS

ONCE THE *"drilling in" operation has been performed and the unquenchable force of nature in the form of pressure has been released from the earth, it is then ever present throughout all of the succeeding operations of building the well.*

★ **Gray Systems of Well Control anticipate the problem of pressure by providing the necessary equipment to control pressure before the "drilling in" operation, a planned operation that is the difference between having heterogeneous parts and fittings, and a coordinated system of well control. This method has been proven in more than 11,000 successful completions.**

GRAY
TOOL COMPANY
HOUSTON

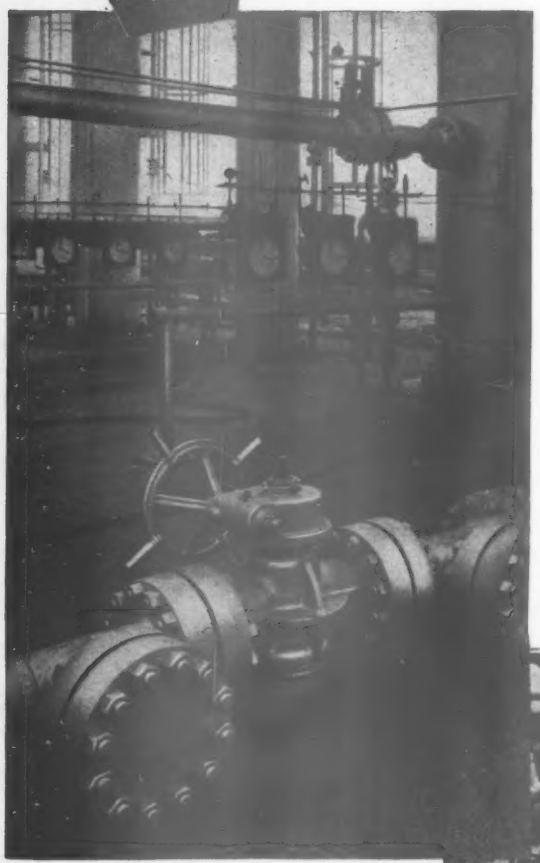
West Coast Distributor: WAGNER-MOREHOUSE, INC., Los Angeles. *Export Representative:* GUY E. DANIELS, 30 Rockefeller Plaza, New York City



Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached

SIMPLIFICATION ★ A VICTORY AID!

X = the Worry Factor!

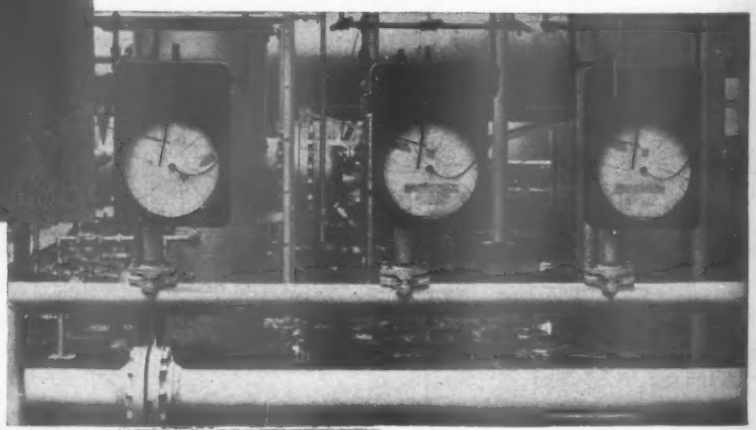


QUANTITY *and* quality . . . speed *plus* accuracy . . . are demanded in the industrial war output.

For years, the petroleum and gas industries have been schooling themselves in efficiency of production . . . aimed at lower operating costs. With this pre-war experience, the industry stands ready and able to do the job now expected of it.

Adequate measurement and control instruments are vital as never before. The worry factor is eliminated by utilizing Metric-American orifice meters . . . instruments of *known* accuracy and dependability.

Consider, for example, its large float area . . . with the wide clearances which prevent loss of accuracy through capillary attraction or any possible dirt collecting in the mercury. Only one of many features that insure sensitiveness, close registration and ruggedness . . . sustained high accuracy without coddling!



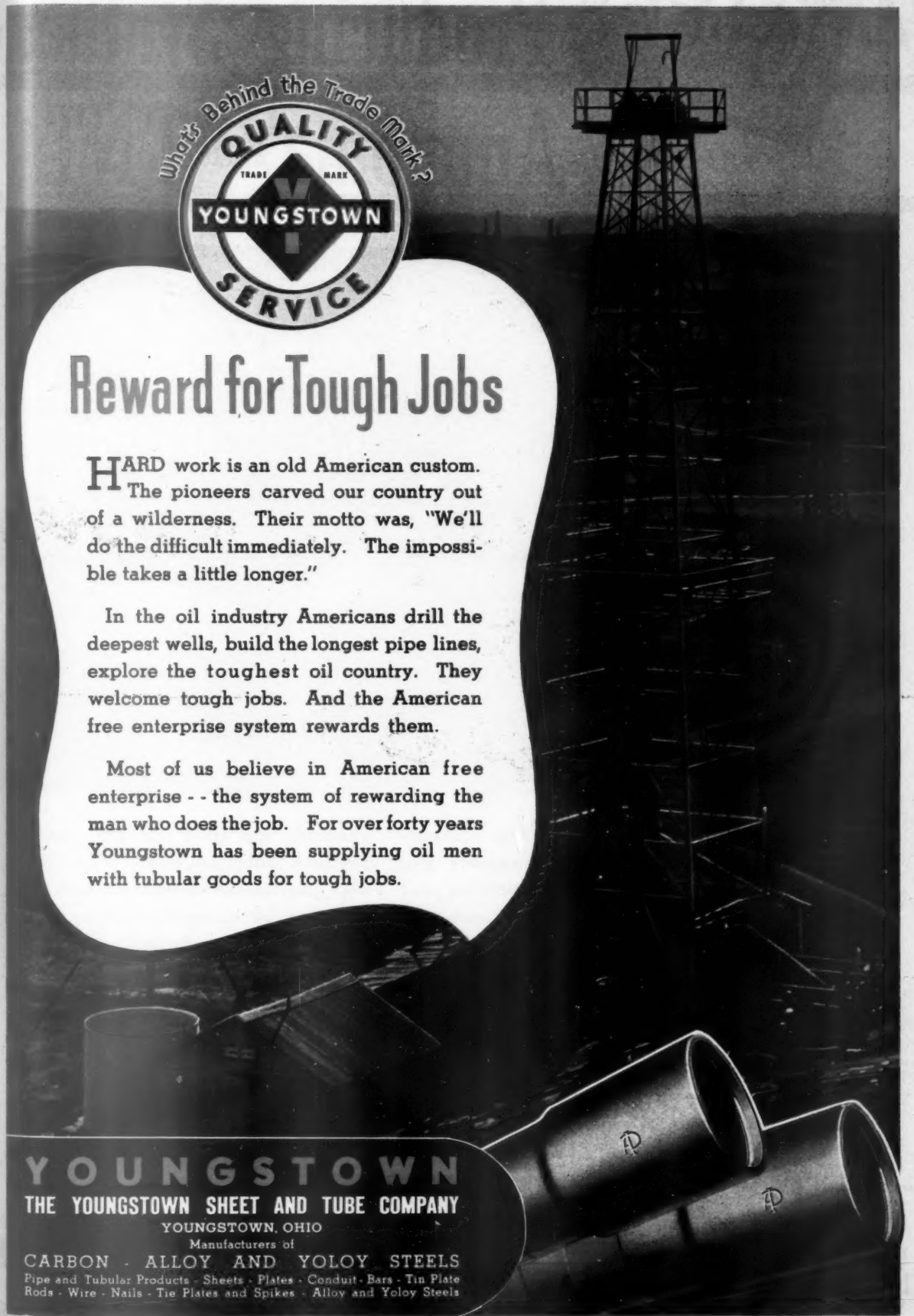
Metric-American orifice meters in distillate plant featuring high-pressure control, with utilization of gas expansion for refrigeration to step up distillate recovery efficiency.

METRIC METAL WORKS • ERIE, PA.

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

Complete literature is available on the specifications, installation and operation of Metric-American orifice meters, flowmeters and control instruments. Write for it.



Reward for Tough Jobs

HARD work is an old American custom. The pioneers carved our country out of a wilderness. Their motto was, "We'll do the difficult immediately. The impossible takes a little longer."

In the oil industry Americans drill the deepest wells, build the longest pipe lines, explore the toughest oil country. They welcome tough jobs. And the American free enterprise system rewards them.

Most of us believe in American free enterprise - - the system of rewarding the man who does the job. For over forty years Youngstown has been supplying oil men with tubular goods for tough jobs.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Tin Plate
Rods - Wire - Nails - Tie Plates and Spikes - Alloy and Yoloy Steels

DELIVERING 24,000 HORSEPOWER

24 G-MV ANGLE's Producing Synthetic Ammonia FOR TNT

TWENTY-FOUR 1000 hp Cooper-Bessemer G-MV compressors in a new western arsenal, turning out synthetic ammonia for the manufacture of TNT! The name and location of the plant, and the date of installation cannot be revealed.

The compressors are ten-cylinder, multi-stage gas-driven V-angle compressors of the compact type widely used in the manufacture of synthetic rubber, plastics, chemicals and other war and peacetime products. Either gas or diesel fuel can be used and the switch from one fuel to the other can be accomplished by making only a few simple changes.

The selection of these compressors for this important national work is a testimonial to their reliability and efficiency. Wherever compressors are used, the name Cooper-Bessemer stands for low over-all cost and long trouble-free operation.

TYPE G-MV ANGLE **Compressors**

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Houston, Dallas, Greggton, Pampa and Odessa, Texas Tulsa Shreveport St. Louis Los Angeles
New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, Wash.

Inspiration plus perspiration

Edison said it takes more perspiration than inspiration to get results

The history of the refining industry is written in its record of continuous improvement in quantity and quality That record has been achieved by the untiring efforts of plant operators as well as research men

Without the skillful and exacting work of the great army of refinery operators to insure practical application of inventions and developments resulting from research, American refiners today could not be producing the enormous volume of 100-octane gasoline that gives our fighting flyers dominance in the air

Operating personnel and research men provide an unbeatable combination

CATALYTIC CRACKING	HYDROFORMING
REFORMING	DEHYDROGENATION
HYDROGENATION	POLYMERIZATION
ALKYLATION	UNISOL TREATING
ISOMERIZATION	RETREATING
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SWEETENING

U. O. P. CATALYSTS U. O. P. INHIBITORS

OIL IS AMMUNITION—USE IT WISELY
Universal Oil Products Co.
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UOP

CARE FOR YOUR CAR FOR YOUR COUNTRY
Petroleum Process Pioneers
For All Refiners

The Refiners Institute of Petroleum Technology

EVEN TIGER BRAND NEEDS IT!

Add life to your wire lines with LUBRICATION

ONE of the most frequent causes of premature wire line failure is lack of proper lubrication. Yet lubrication is such a simple means of extending life that it seems incredible that wire line users should overlook it. But they do.

Every American Tiger Brand Wire Line comes to you from the factory, properly lubricated and ready for service. But factory lubrication, no matter how efficient, will not last the life of the line. Field lubrication at regular intervals is absolutely essential. Wire rope is a machine, composed of many working parts. It requires periodic lubrication to reduce frictional wear.

Use a well-tested lubricant like Tiger-Lube which has been developed through years of study and research. Be sure that the line surface is clean and that the lubricant is applied uniformly and thoroughly.

Lubrication is insurance against corrosion and is the safest way to prevent excessive internal and external wear. Lubrication will materially assist in controlling the wear on sheaves and drums and in prolonging wire line life, resulting in increased operating efficiency.

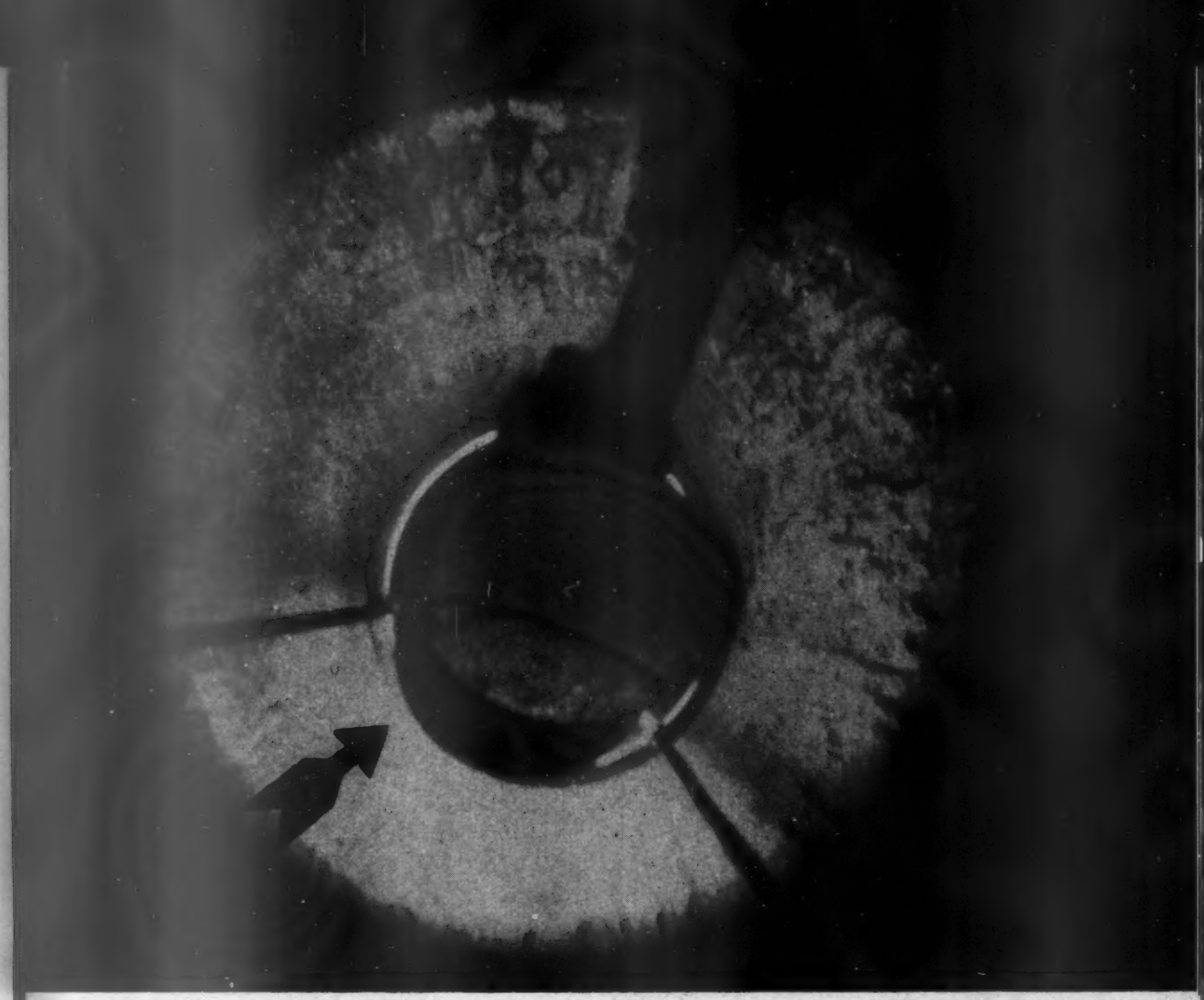
AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Export Company, New York

Excellay Preformed

UNITED STATES STEEL



TUBOSCOPE VIEW OF

A TWIST-OFF THAT *Didn't* HAPPEN!

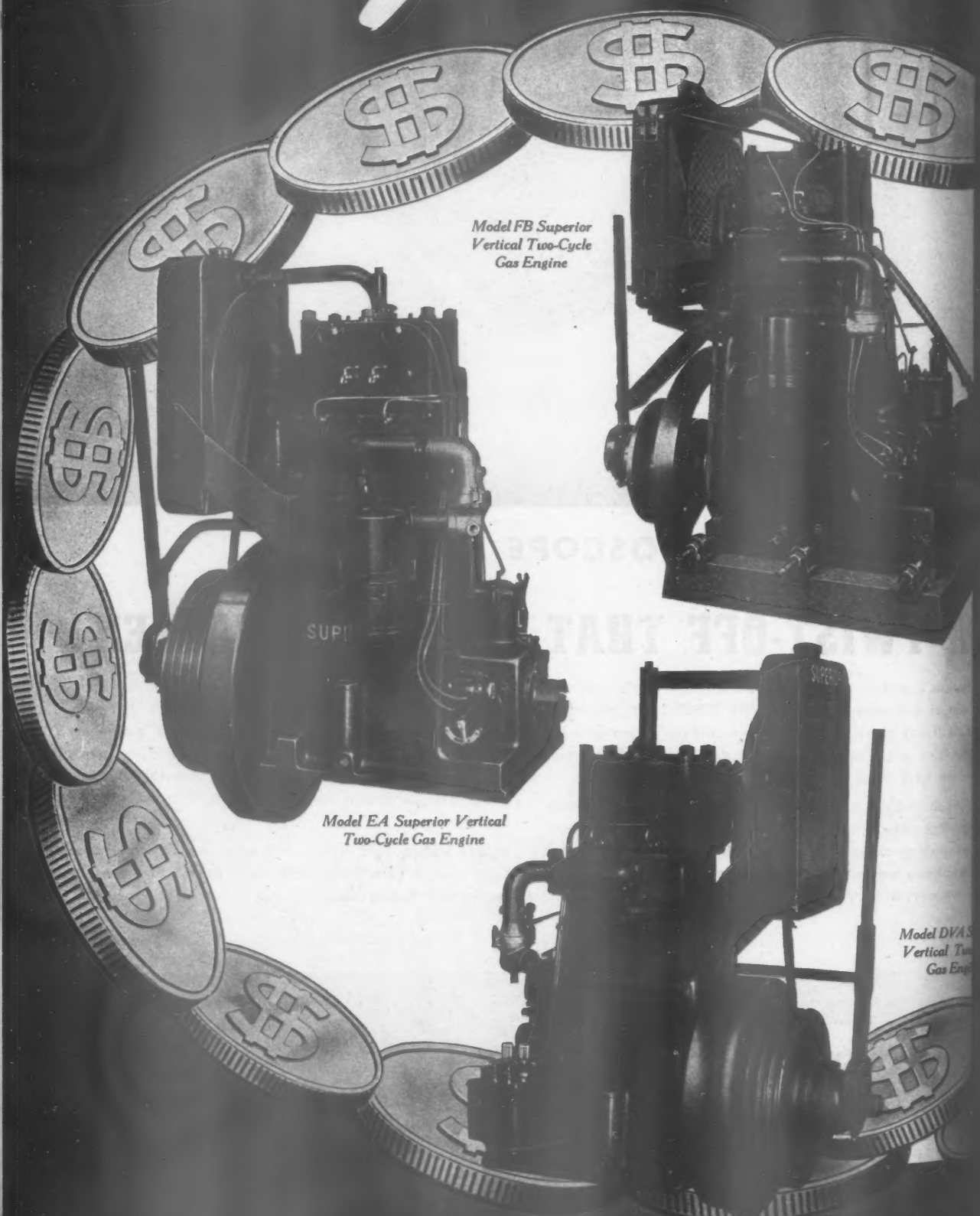
Here is a picture of a fatigue crack in the inside wall of a joint of drill pipe made through a TUBOSCOPE instrument. Had it not been detected before drilling began and the defective joint removed from the drilling string, a twist-off would have soon resulted.

Fatigue cracks, corrosion pits, internal seams and similar insidious defects in drill pipe are responsible for a substantial portion of costly fishing operations. Because they are completely hidden from view, the unsuspecting drilling crew is seldom aware of their presence until it is too late.

TUBOSCOPE, the modern scientific internal tubular inspection service, reveals these hidden weak points in drill pipe. The internal walls of each joint of pipe are thoroughly cleaned, powerfully illuminated and magnified to permit close visual inspection by highly trained operators. External gauging to determine body wall reduction completes the examination.

Include TUBOSCOPE in your drilling routine. Operators who have used it consistently have never failed to materially reduce their fishing jobs.

Superior



Model FB Superior Vertical Two-Cycle Gas Engine

Model EA Superior Vertical Two-Cycle Gas Engine

Model DVA S... Vertical Tw... Gas Engi...

LEROI
Dependable power in the making . . . final assembly of
valve-in-head engine
TURN THE PAGE

Engines Give You Dependable, Economical Power for Oil-Well Pumping

When you equip your oil-well pumps with Le Roi Engines, you have definite assurance of three important factors. (1) You have an *extra* reserve of power when the going is tough. (2) You have an *extra* margin of economy that permits you to operate at a profit. (3) You have the *extra* accessories that improve the engine's performance and safeguard its life.

Because Le Roi Engines are dependable — because they are easy to maintain — and because there is minimum interruption of service, Le Roi owners, everywhere, are congratulating themselves on their good judgment in selecting Le Roi Engines.

There is a variety of models, complete range of sizes from 3 to 115 H.P. — also drilling and pipe line engines up to 400 H.P. Use natural gas, gasoline, or butane. Write today for descriptive bulletins.

LE ROI COMPANY
1766 S. 68th St., Milwaukee 14, Wis.
BRANCH: TULSA, OKLAHOMA

LE ROI

Distributors

General Machine & Supply Co.—Wichita Falls, Odessa, Tex.; Southern Engine & Pump Co.—Houston, Dallas, Kilgore, Tex.; Western Machinery Co.—St. Louis, Mo.; Centralia, Ill.; Le Roi Sls Machinery Co.—Los Angeles, Calif.

ON THE REVERSE SIDE — Final assembly on Le Roi Engines by a skilled mechanic who takes pride in producing engines of outstanding quality. The name "Le Roi" has meant "dependability" for more than a quarter of a century.

Le Roi Engine Features

OVERHEAD VALVE ARRANGEMENT

provides greater accessibility for adjustments and reduces maintenance and repairs to a minimum. You are assured of fuel economy and lower overall operating cost.

REMOVABLE WET SLEEVE CYLINDERS

are easily and inexpensively replaced. Eliminate reboring, and assure uniform expansion of true cylinder bores. Reduce wear, permit accurate control of cylinder lubrication, eliminate oil pumping.

HIGH PRODUCTION STANDARDS

Exceptional precision in machining, backed up by many precision instruments such as dynamic balancers for obtaining maximum perfection of balance in crankshafts.

WEATHERPROOF, PILFERPROOF ENCLOSURES

Self-contained power units housed for protection against the elements. They're pilferproof for they can be locked to prevent tampering with or theft of accessories.

HARDENED VALVE SEAT INSERTS

minimize the frequency of valve adjustments, reduce grinding to a minimum. Also considerably reduce wear on valve seats, pitting of the valves, and danger of valve burning.

CAREFULLY INSPECTED

The results of thorough inspection and testing show up for years in steady, dependable service with fewer stoppages and less lost time.

FOR many years the leaders in the petroleum refining industry, not only in America but throughout the world, have used McKee process engineering, plant design and construction.

• When the government called on the refining industry to supply the war needs of the United Nations, the leaders again turned to McKee for facilities to meet this demand.

• Until censorship is lifted we cannot reveal names or locations showing the extent of McKee activities, but we *can* tell you that McKee's wartime engineering has accounted for thousands of barrels per day of Aviation Gasoline capacity, fluid catalytic cracking capacity, and other modern war-essential products.

• When the war ends, leaders of the industry will again call on McKee to reconvert their plants to meet postwar conditions.

• McKee can help plan *your* reconversion program *now* to meet postwar competition on a profitable basis.

Arthur G. McKee & Company

★ *Engineers and Contractors* ★

2300 CHESTER AVENUE • CLEVELAND, OHIO

TOUGHEST "TOP KICKS" *on the waterfront*

ARMY TRANSPORTATION CORPS TUGS BY LEVINGSTON

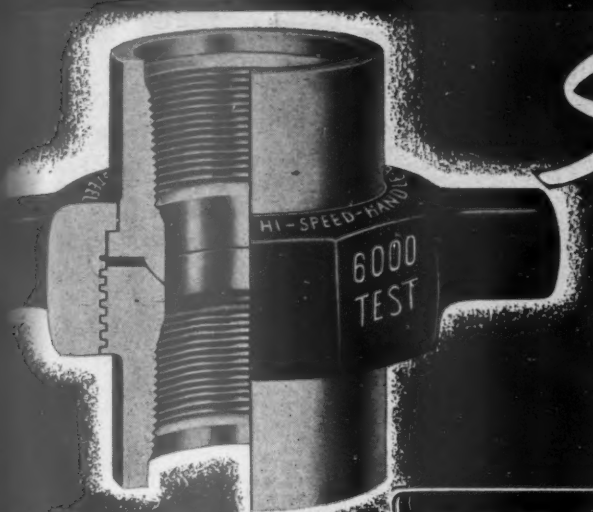
The design and construction features that have made Levingston tugs the standard of comparison in the work boat field were so near to the exacting requirements of the U. S. Army that few, if any, alterations in our standard design were required. Many of these sturdy, efficient, Diesel-powered, all-welded steel tugs are now serving in the Army's navy . . . to expedite the export of war material, to speed up inland waterways traffic and to aid in warship and cargo vessel construction and maintenance.

With increased facilities, expanded personnel and more than twenty years of shipbuilding experience, you may look to Levingston for the finest marine equipment and expert maintenance money can buy. But until victory is won, your best buy is bonds!

Levingston

SHIPBUILDING COMPANY

ORANGE TEXAS

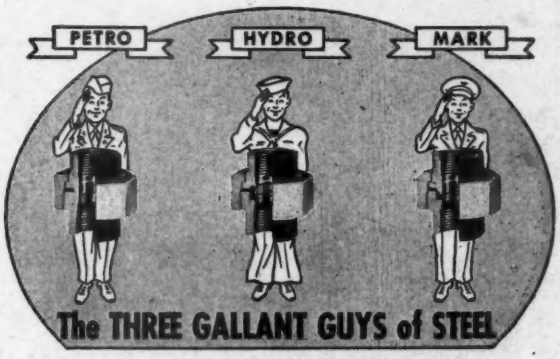


Safety Speed Durability

WITH

FORGED STEEL UNIONS

PETRO STEEL TO STEEL | **HYDRO** BRONZE TO BRONZE | **MARK** BRONZE TO STEEL | **A.A.R. HANDLE BAR** STEEL TO STEEL & BRONZE TO BRONZE



AT YOUR SERVICE

- 2000 and 5000 pounds working pressure with Hi-Speed Handle-Bar Unions.
- Standardized Hi-Speed modified Acme Threads permanently lubricated with Udylite Cadmium.
- All rust-proofed with Udylite Cadmium, or Black with Udylited Nut
- Recommended for Steam, Oil, Gas, Air, Water, Mud Lines, Acidizing and Cementing Service.

Clayton **MARK** *& Company*

ORIGINATORS AND PIONEERS OF STEEL UNIONS SINCE 1912

Order by Trade Name from Your Continental Salesman

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THE CONTINENTAL SUPPLY COMPANY

General Offices: DALLAS, TEXAS

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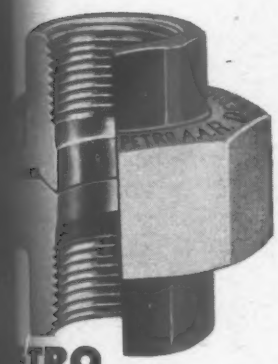
MEXICO ARGENTINA ENGLAND TRINIDAD BRAZIL

CONTINENTAL

NDLE BAR
nd 6000 Pounds
Test



TRO

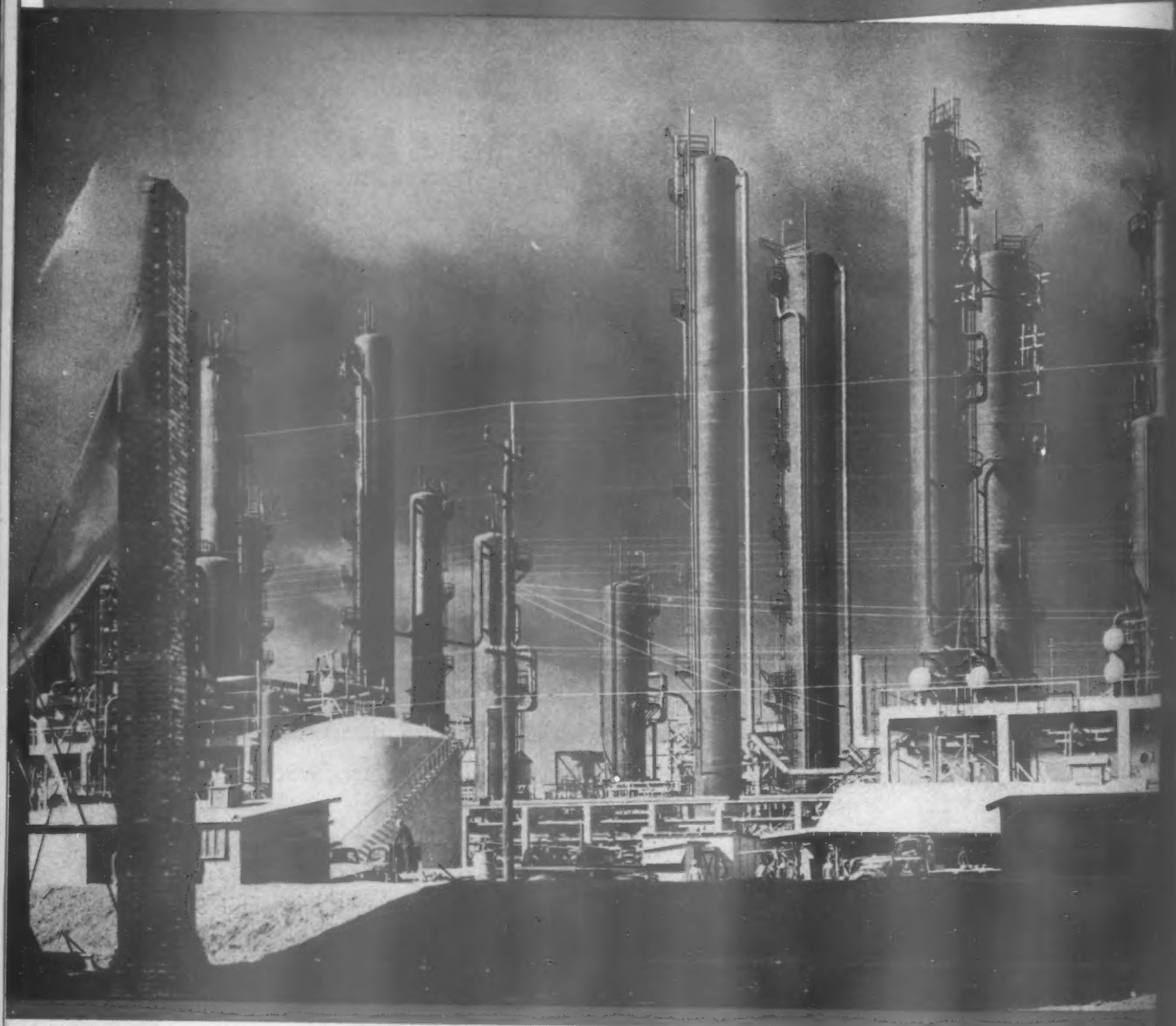
RIFICE

Unions, for flow control of Steam, ..., and Fluids, also for metering ... ¼" to 3".
RITE FOR PAMPHLET AM-67

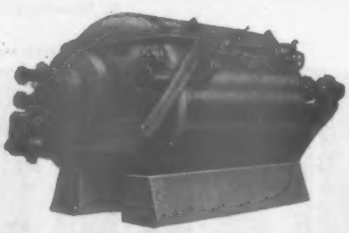
MANY TOWERS MAKING

BUTADIENE

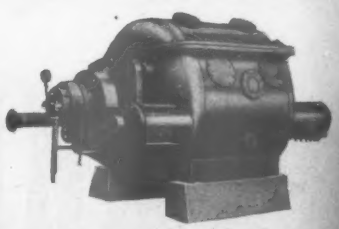
at PORT NECHES



Other Oliver United Filters particularly suitable for use in refineries and petro-chemical plants include:



Oliver Precoat Filter Pressure Type



Oliver Continuous Pressure Filter

SECURALOY is drillable

Remember:

Whenever desired SECURALOY can be readily and completely removed with a drilling bit and the cuttings circulated out of the hole with the drilling fluid.

SECURALOY can be used the same as ordinary metals. It increases the efficiency of production and completion work . . . permits greater flexibility in operating technique . . . and decreases the mechanical limitations which restrict complete recovery from a well.

When you use Securaloy you no longer jeopardize your wells by liners and tools that become frozen in the hole and the danger of costly repair work and risky fishing operations is practically eliminated. This greater flexibility of operating techniques safeguards you against many of the common risks that lead to incomplete development and premature abandonment.

Securaloy is the cheapest—and best—insurance you can buy to safeguard the producing life of your wells.

SECURITY ENGINEERING CO., INC.

MAIN OFFICE AND PLANT: WHITTIER, CALIFORNIA

TEXAS: Houston, Conroe, Odessa • ILLINOIS: Centralia

WYOMING: Casper • NEW YORK CITY: 420 Lexington Ave.

McCullough
GUN PERFORATOR
COMPLETION METHODS
Brown Line Print *No. 6*

Set Thru

For Trouble-Free Two-Zone Completions

Set the casing through the oil and gas zones and cement the string solid. Then gun perforate the selected zones with exactly spaced and located holes of the size and number required. Any desired arrangement can be employed in flowing the well.

The solid cement sheath eliminates water trouble, prevents migration of fluid from one zone to another behind the pipe even though the zones are close together, and protects and supports the casing. Furthermore, the well is kept full size to facilitate future work.

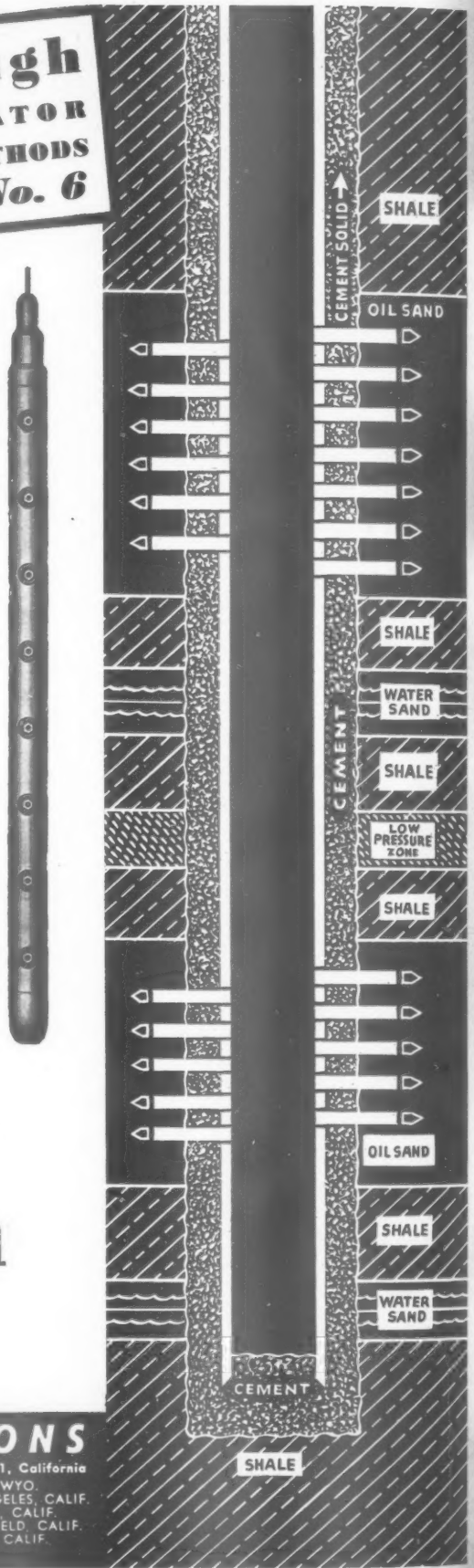
Call the nearest McCullough service branch for information on this successful two-zone completion method. Experienced McCullough field men have up-to-the-minute knowledge of Gun Perforator Completion Methods and will be glad to work with you.

For Dependable Performance, Use The

Hard Shooting-exact SPACING

McCullough

GUN PERFORATOR



20 SERVICE LOCATIONS

McCULLOUGH TOOL COMPANY . . . 5820 South Alameda Street, Los Angeles 11, California

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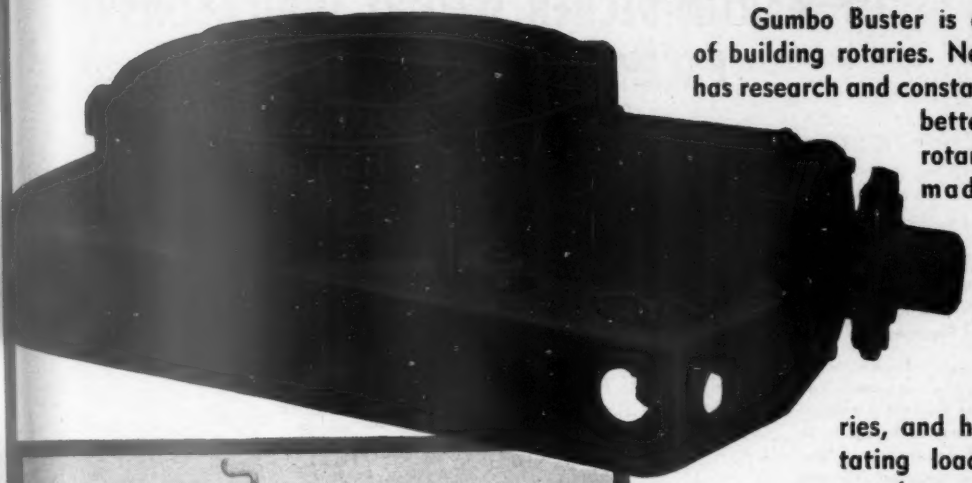
The Oldest Builder of Rotaries

GUMBO BUSTER

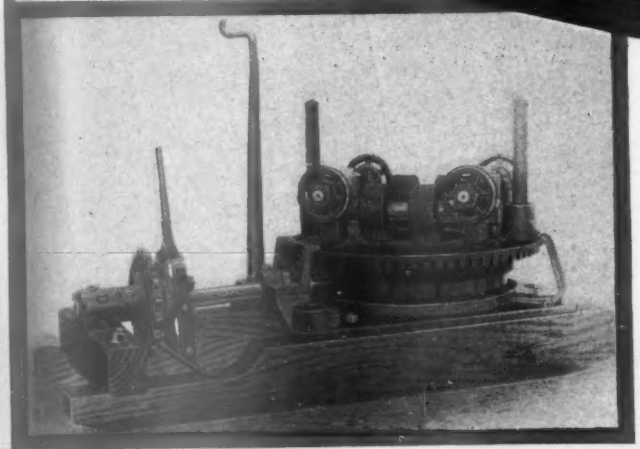
Has the Newest Improvements in Rotaries



Gumbo Buster is entering its 44th year of building rotaries. Never, during that time, has research and constant improvement toward better rotaries stopped. The rotary, shown at left, is made in 17½" and 21" sizes. The larger model, pictured below, is made in 26" size. They are oil bath, fully enclosed, roller bearing rotaries, and handle the heaviest rotating loads at highest drilling speeds.

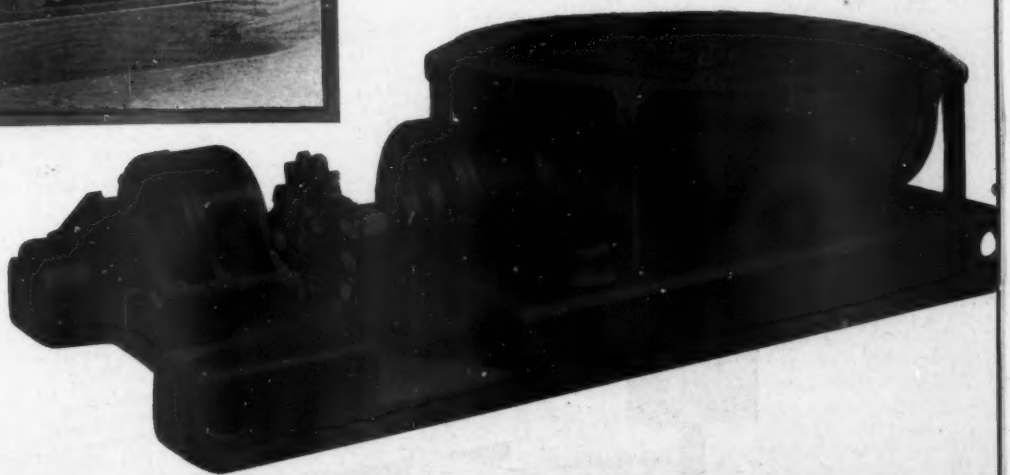
These modern, streamlined rotaries are a far cry from Gumbo Buster's 1900 model, pictured at left . . . the oil industry's first successful rotary.

For specifications see Page 205, your new Composite Catalog.



...original Gumbo Buster rotary was ... size, weighed 3,000 pounds, and ... for $250.

...Gumbo Buster Army-...y "E" Flag now flies a ...th star for continued ...llence in production.



YEARS OF MANUFACTURING ROTARY DRILLING EQUIPMENT

...E AMERICAN WELL & PROSPECTING CO.

GUMBO BUSTER

DISTRIBUTED BY:
Republic Supply Co., Houston
Bethlehem Supply Co., Tulsa

CORSICANA, TEXAS

EXPORT OFFICE:
Petroleum Machinery Corp.,
30 Rockefeller Plaza, N.Y.C.

Here's Proof

OF MARTIN-DECKER WEIGHT INDICATORS' EXCEPTIONAL ACCURACY

WHILE Olson Machine tests show Martin-Decker instruments are accurate on a single line, perhaps you've wondered what happened to the values after they had traveled through 4, 6, 8, or 10 lines from the hook to the diaphragm.

We now have the answer. The same Weight Indicator which is used in the oilfields has been adapted to a new use, that of measuring the loads being handled by cranes in shipyards, Navy yards, industrial plants, etc. The load measuring problem on this new application is identical to that encountered with drilling well hoists—the same type of cable, the same various cable sizes, the same crown and traveling blocks, the same number of lines strung, etc. being used. Exhaustive tests made with the same Sealtite hydraulic hook-up with diaphragm and direct reading gauge and Vernier that is used in the oilfields show a negligible error.

This chart gives data obtained during test runs in two different parts of the country—(details furnished on request).

There's a Martin-Decker instrument for every weight control need!

Write for catalog

THE "SEALTITE"

CRANE WEIGHT INDICATOR—MARTIN-DECKER CORP.
Installed on Crane 55

TEST DATA

No Load Radius Feet	Rated Capacity Lbs.	Loads Total Lbs.	Indicator Readings				Error		Drift Ft.	Radius Error %
			Read Tons	Lbs.	Radius No Load	Radius Load	Lbs.	% of Load		
125	10,000	8,960	4.5	9,000	125	125.6	40	+0.4	0.6	0
120	12,000	12,185	6.1	12,200	120	120.4	15	+0.1	0.4	0
110	15,000	15,150	7.7	15,400	110	110.8	250	+1.6	0.8	0
100	18,000	18,180	9.1	18,200	100	101**	20	+0.1	1.0	0
90	22,000	21,325	10.6	21,200	90	91.5	125	−0.6	1.5	0
80	26,000	27,320	13.3	26,600	79.2	81	720	−2.6	1.8	1.0
70	32,000	33,510	16.4	32,800	68.5	70	710	−2.1	1.5	2.4
70*	32,000	33,510	17.1	34,200	68.5	70	690	+2.0	1.5	2.4

* Readings were taken after load was stopped while lowering; all other readings taken after load was stopped while hoisting.
Indicator sensitivity—Added weight of man indicated readily at 33,510 lb. load.
** Actual measurement 100 ft. 10 inches. This was only radius checked under load.

Results of test using actual weights to check the accuracy of both the auxiliary and main hoist on Star Crane.

AUXILIARY HOIST

WEIGHTS	GAUGE IN TONS	INDICATION	
9115	4.0	8980	
26330	11.5	25800	
35445	15.5	34700	4 Lines
9115	4.2	9400	7/8" 6 x 37
18520	8.2	18300	I.P.S. H.C.

MAIN HOIST

WEIGHTS	GAUGE IN TONS	INDICATION	
9115	4.0	8980	
18420	8.1	18200	
26330	11.2	25200	8 Lines
63360	28.5	63800	1 1/8" 6 x 37
81835	36.5	81800	I.P.S. H.C.
100435	45.5	100100	

The left hand column shows the actual weights lifted.
The center column shows gauge readings in long tons.
The right hand column shows the long ton values converted back into pounds taken from our Weight Indicator.

HOME OF THE WEIGHT INDICATOR

MARTIN DECKER CORP.

LONG BEACH, CALIFORNIA

SAN JOAQUIN VALLEY: A. F. McQUISTON, BAKERSFIELD, CALIFORNIA
MID CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS

SPEEDING V-DAY

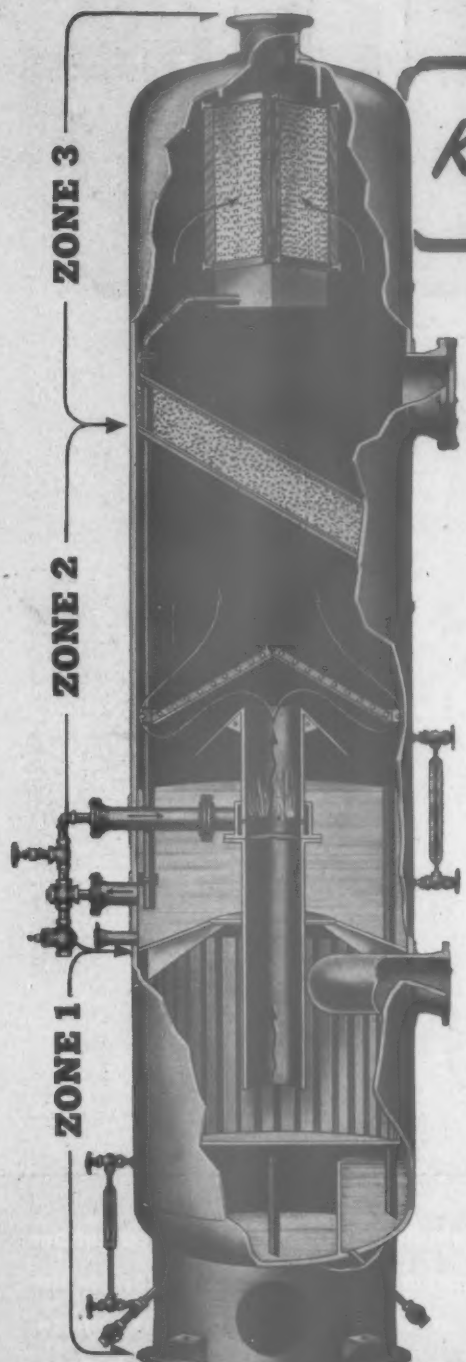
From butadiene comes the fighting rubber for the battle fronts . . . the cushions for the wheels of industry. In plants like these, devoted to the manufacture of butadiene, Ladish forged steel flanges are doing their part in the development of synthetic rubber —speeding the day of victory.

ARMY E NAVY

FITTINGS DIVISION

LADISH DROP FORGE CO.

CUDAHY • WISCONSIN



KEEP GAS CLEAN

WITH A

PRITCHARD
"THREE ZONE" GAS SCRUBBER

Cleans Gas Clean . . . Prevents Excessive Wear

ZONE ONE REMOVES LIQUIDS

Nearly 95% of "nuisance" liquids are thrown by whirling gas through slotted sides of bottom chamber into reservoir at bottom of scrubber and are removed.

ZONE TWO TRAPS DUST

Free gas and dust entering cleaning chamber from below is thoroughly mixed with cleaning fluid. Dust is wetted which prevents it from going through wet agglomerater, or packing section.

ZONE THREE EXTRACTS MIST

Mist which has not been eliminated by mixing and immersion in cleaning fluid, comes in contact with the wetted agglomerater, where the minute drops collect, forming larger drops until they finally fall back into cleaning fluid, the gas continuing on its way through the packing section . . . *free and clean.*

J. F. PRITCHARD & CO., *Gas Division*
Fidelity Building, Kansas City, Missouri

Booklet GS-44 contains detailed information and diagrams.
Write for your copy

KANSAS CITY
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ENGINEERS AND CONSTRUCTORS
FOR THE CHEMICAL • PETROLEUM • GAS AND POWER INDUSTRIES
Manufacturers of Mechanical and Atmospheric Cooling Towers

Hauling America's Most Critical Jobs . . .

Spicer Transmissions, Auxiliaries and Universal Joints

Hauling massive logs from mountainside forests, and moving great hull sections in busy shipyards . . . these are a few of the jobs which Spicer-equipped trucks are doing to meet America's urgent wartime material and construction needs. Wherever men, materials and munitions must be moved . . . on the battle front and home front . . . Spicer Transmissions, Auxiliaries, Universal Joints and Axles deliver power that will help us reach the goal of peace. Then Spicer again will be ready to serve immediately the tremendous needs of America's automotive industry. Spicer Manufacturing Corporation, Toledo, Ohio.

41 YEARS OF Spicer SERVICE

BROWN-LIPE CLUTCHES AND TRANSMISSIONS • SALISBURY FRONT AND REAR AXLES SPICER UNIVERSAL JOINTS • PARISH FRAMES, STAMPINGS

BLOCK SELECTIONS
from the
McKISSICK CATALOGUE

★ *Buy* MORE WAR BONDS

SAFETY TUBING BLOCK

The non detachable guards provide permanent safety. Latch type becket eliminates possibility of elevator links or hook becoming detached. To thread this block it is only necessary to remove one bolt, which allows plate to swing. Elevator links or hook may be inserted without removing becket from block.

SAFETY FLOOR BLOCK

Properly enclosed to prevent accidents. The guards do not need to be detached for threading the line. Roller bearing sheaves are machined to line size. These blocks are available with floor plate solid U-clevis, latch type becket or any combination to suit individual requirements.

With ball bearing swivel, universal adapter and base plate.

SAFETY TRAVELING BLOCK

This is a sturdy and compact block designed for use in the new smaller rotary drilling units. It is streamlined for speed and safety. All sizes are furnished to connect to drilling hooks with a rigid joint, or with a lower clevis to carry the top bail on any type or size hook.

Catalog on Request

McKISSICK PRODUCTS CORPORATION
TULSA, OKLAHOMA

Say "DOUBLE E"

WHEN ORDERING THESE IMPORTANT ITEMS AND BE SURE OF TOP PERFORMANCE!

"Double E" products are backed by years of experience in solving oil field problems where these specialties have had to meet a wide variety of severe conditions. Formerly sold under the universally known name of Kibele, "Double E" products are now improved to new heights of efficiency and performance. Specify "Double E" products—play safe, save money!

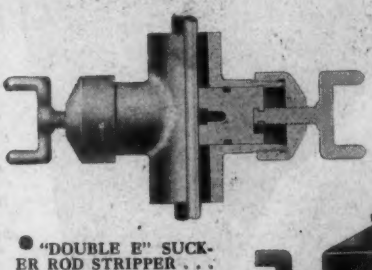
(Manufactured under R. A. Wilson patents)

"DOUBLE E" ALVE-IN-EAD PACKER . . . Will not stick hole . . . will leak . . . will ratchet up hole a pumping well.

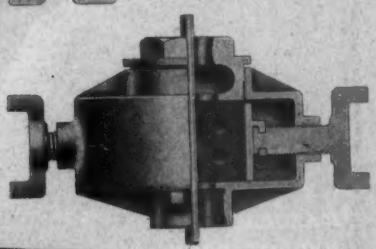
● "DOUBLE E" 3-STEP TUBING CATCHER . . . For wells of more than average depth, anchor your tubing for higher pumping efficiency. Note large slip and by-pass area.

● "DOUBLE E" 2-STEP TUBING CATCHER . . . For wells of average depth. Multiple step design affords greater slip surface — distributes load. With or without anchor.

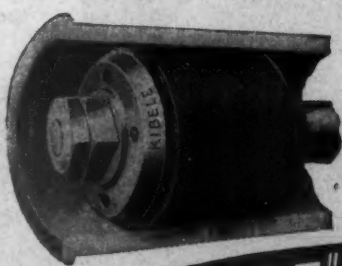
● "DOUBLE E" SWAB . . . Controlled expansion of cups assures full load per pull, and greatly prolongs life of cups.



● "DOUBLE E" BLOW-OUT PREVENTER . . . A high pressure safety device designed to stop the heading of wells while pulling rods or running bombs for temperature or pressure on wire lines.



● "DOUBLE E" SUCKER ROD STRIPPER . . . Contains adjustable retractable rubbers which prolongs their life, effects considerable savings; renders highest efficiency.



● "DOUBLE E" KIBELE TYPE BOILER FEED PISTONS . . . Nothing to wear except packing ring, which can be replaced quickly and easily.

"DOUBLE E" Products

EQUIPMENT ENGINEERS INC.

2039 AMELIA ST. ★ DALLAS 9, TEXAS

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For Success

WARREN'S STABILIZED NATURAL GASOLINE

Essential to the success of our war effort is the superior quality and adequate supply of the motor fuel for our fighting machines on land and sea and in the air. Without 100 Octane Gasoline our great airplanes could not fly and drop their bombs; without superior motor fuel our mosquito boats and landing barges; trucks, ambulances and tanks—traveling maintenance, kitchen and hospital units—could not transport and serve our fighting forces.

Warren's patriotic duty is to meet the military requirements for Warren's Stabilized Natural Gasoline and Chemical Grade* Iso-Butane, Normal Butane and Iso-Pentane; our next obligation is to serve the needs for civilian motor fuel.

Chemical Grade*
HYDROCARBONS

Normal Butane
Iso-Butane
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Manufacturers, Exporters and Marketers of Natural Gasoline and Liquefied Petroleum Gas

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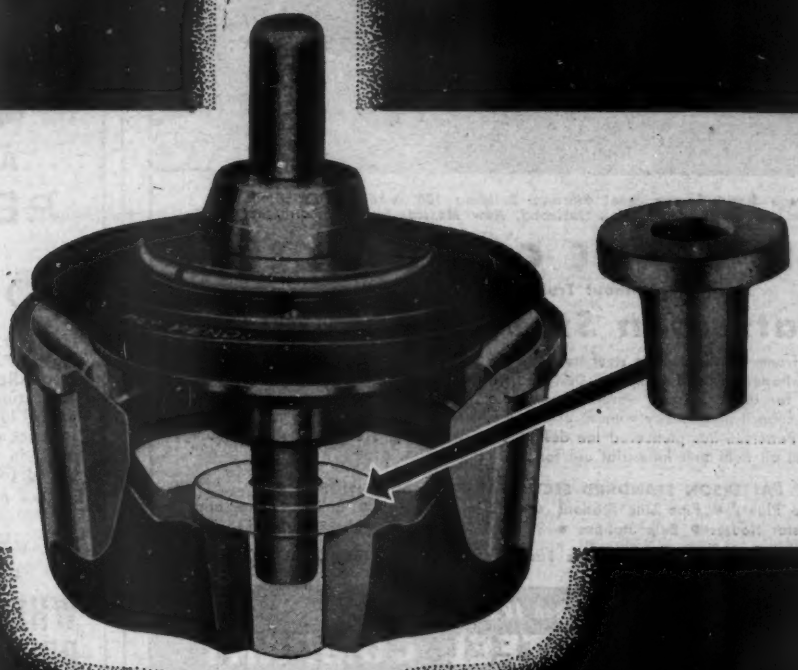
Export Terminals: Corpus Christi, Port Arthur and Norsworthy, Houston, Texas, Lake Charles, La., and Marcus Hook, Pa.

ISSION VALVES *save materials*



important in total war . . . money-saving any time

THE MISSION principle of "Change the bushing and save the seat" saves vital war metal.

You save an 18-pound seat by changing a one-pound wear-taking bushing. Or in terms of money, you save a seat costing $15 (Series 3. Other sizes in proportion) by merely replacing the worn bushing with a new one costing $1.75.

In many instances the life of Mission Valves has been extended 200% to 500% longer by the operator giving attention to replacing the wear-taking bushing at the proper times, thus saving critical war material.

Mission Compound-308 Valve Inserts save vital war rubber.

They last three to five times longer than regular inserts in ordinary mud, and up to ten times longer than regular oil-resisting inserts in hot mud, treated mud, or oil and gas.

GUARANTEE { If a competitive test in your pumps does not prove that Mission Slush Pump Valves (with Compound-308 inserts) are more economical than the valves you are now using, the entire purchase price of these valves will be promptly refunded. }

HANGE THE BUSHING
ND SAVE THE SEAT

MISSION
MANUFACTURING CO.
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Patterson Rigid Frame Steel Storage Building 100' x 600' Fabricated and Erected for Union Potash Co., Carlsbad, New Mexico, by Patterson Steel Co.

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Without Trusses or Supports

A Patterson Steel Development!

The rigid frame construction of steel buildings for industrial use is an engineering development of Patterson Steel Company. Designed without trusses or supports, these buildings are ideal for industrial and warehouse purposes. They provide maximum floor space, operating capacity and utility without useless space and waste of building materials. For 23 years, Patterson has pioneered the design, fabrication and erection of steel buildings for general oil field and industrial use for special purposes.

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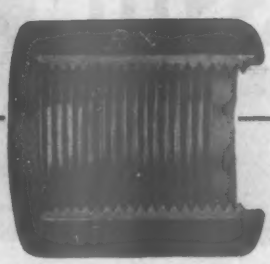

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RECESSED

LINE PIPE

COUPLINGS

Our special patented process of recessing "X-L" Couplings assures perfect alignment, tighter joints and protection of vanishing threads—giving longer life to the line. Made in strict accordance with A.P.I. standards in all sizes. Microscopically tested to insure maximum accuracy.

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WISCONSIN *Air-Cooled* ENGINES

Every connecting rod, in every Wisconsin Air-Cooled Engine, is precision-balanced to eliminate all weight variations in excess of ¼-ounce per rod.

This is admittedly cutting it pretty fine for a rough-and-ready heavy-duty engine . . . but not too fine for these fine engines. Smooth operation, reduction of vibration to a negligible minimum, prevention of excessive wear . . . these are factors that can be controlled only by the most meticulous care and attention to such small details as this in building an engine.

The value of this attention comes into play when a Wisconsin Air-Cooled Engine powers your equipment.

Most H.P. per pound

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

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Immediate Deliveries
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Refinery Equipment, Inc.

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Tulsa, Oklahoma

FOR SALE: 1—Gasoline Power Drilling rig good for 3000'. 2 Jones Stagg Gas lifts complete with lines. Also Steam Drilling rigs and pipe and casing of all sizes. We also purchase abandoned Leases, Refineries, pipe lines and other oil field equipment. If in need of material, or have material for sale, communicate with LOUISIANA IRON & SUPPLY Co., Shreveport, La., Phone 5223, or LD 1.

FOR SALE: 72 Beaird Steel Headers, 4" I.D., 2000 lbs. test press; 30 Brewster Steel Headers, 4" I.D., 3000 lbs. test press; 30 B.W.Y. C.R. Headers, 4" I.D., High Pressure. ARROW PETROLEUM CO., Centralia, Illinois.

1—Parkersburg SC11 pumping unit stroke 9' to 11' in excellent condition. At a bargain price. Jos. Greenspon's Son Pipe Corp., Natl. Stock Yards, Illinois.

IDECO draw works, Ideal & Oil Well twin cylinder drilling engines, 18" Wilson-Snyder, & 14" Ideal pumps, Drilling cables, Engine substructure, Moon generator, Brewster core reel & line, Brewster 3½" drill collar, core barrels, etc., 7" Hughes gate valve 3000#, 7x3x8 Worthington boiler feed pump, also 6x5½x6 Gardner-Quincy, American overshot 8¼" OD, Wilson 4½" & 3½" Drill tongs, Wilson 4½" & 3½" elevators, 4½" Mission slips, 3½" WKM slips. Other equipment. First class. Priced right. Sorrento Petroleum Corp., American Bank Building, New Orleans, La.

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50 TONS 4-6-7-inch gate valves, also L & T and drilling valves. Sell all by the ton—about 60 tons in all. Independent Tank Co., Seminole, Okla.

FOR SALE: At Pampa, Texas, 5,600 feet 4½" used drill pipe, full hole tool joints, A.P.I. thread. Murphy and McKernan, Pampa, Texas.

COMPRESSORS—RESHOPPED

1—80 HP. Clark, direct driven with choice of 6½, 7¼, 7½, 9, 12, 13 & 18" x 20" compressor cylinders. 1—10 x 4 x 10 Ingersoll Rand. 1—11 x 5 x 12 Chicago Pneumatic. 1—8 x 6 Twin Curtis. 1—4½ x 5 Ingersoll Rand.

Stefco Sect. Steel Buildings
1—30 x 160 x 12. 1—16 x 24 x 16.
1—20 x 27 x 8. 1—8 x 10 x 8.

NOLAN SALES CORP. TULSA, OKLA.

2,000' 10" O.D. P.E. 20# Pipe
12,500' 12¾" O.D. Plain End 33# Pipe
5,000' 18" O.D. P.E. 59# Pipe

A. A. Gilbert Pipe & Supply Co.
P.O. Box 986, Shreveport, La.

FOR SALE—REFINERY EQUIPMENT

. . . from one of the largest refineries on the Pacific Coast

For Catalog, wire or write

ROUSE & ROUSE
1228 So. Main St., Los Angeles 15, Calif.

FOR SALE: 1—84' angle iron derrick with crown block. $300.00. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE: 1 Steel Stack 55' x 4' diameter x ¼". ARROW PETROLEUM CO., Centralia, Ill.

FOR SALE: 1 Wagner Electric Motor Type B.P. Model 22 T. Three Phase 60 Cycle, 220 Volts, 850 R.P.M.'s, 25 hp. Price $300.00. Arrow Petroleum Co., Centralia, Ill.

FOR SALE: 85 hp. Titusville Iron Works boiler with trimmings consisting of water gauges, steam gauge, pop valve, 2 blow-off valves, injector, John Zink gas burners and smoke stack. Boiler like new and carries Hartford insurance for 125 pounds. W. C. Daugherty, 148 So. Darlington, Tulsa 4, Okla.

FOR SALE: Practically New Star 76 Drilling Machine, 5000 foot Spooling Capacity Powered with SRK WAUKESHA ENGINE. Shulman Brothers, Box 285, Vandalia, Ill.

A SMALL galvanizing plant complete for sale at a bargain. Contact M. G. McCool, American Iron and Machine Works Company, Oklahoma City, Okla.

FOR SALE: White Truck, 1447 gallon tank capacity, hose reel, pump and meter. Arrow Petroleum Co., Forest Park, Illinois.

FOR SALE: 50 Low 500 bbl. steel bolted Tanks
25—1000 bbl. steel bolted Tanks
50—250 bbl. steel bolted Tanks
Would like to sell erected, any amount in Oklahoma, Kansas or Texas, New Mexico. Also good stock of Grain Tanks. Price by writing.

Independent Tank Co., Seminole, Oklahoma

FOR SALE: In Oklahoma, 2—18" x 5" x 18" National Transit D.P.P. Steam Pumps, $750.00 each. Cities Service Oil, Patridge, Bartlesville, Okla.

For Sale—The Following Used Equipment Located at Vinton, Louisiana

9 Ideco 94 Ft. galvanized steel derricks 159,000# capacity with crows nest excellent condition.
8 G. E. Induction Motors, 15-35 H.P., 1150-550 R.P.M., 440 Volt, three-phase
6 Transformers.
8 G. E. Manual Controllers, Service oil well pumping type C. R. 3209-60 cycle. D. L. 2203414, 35-15 H.P. 440 Volt. three-phase, with grid stand.
6 3 sheave Ideco production crown blocks, 3 sheave 22" x 2" 15/16 trunnions, W/2—10" x 7" beams.
1 Cable tool drilling crown block complete, W/5 sheaves, one 30" crown sheave, one 28" sand sheave and 4-24" casing sheaves all having 5" trunnions, W/Bearings, 4 Beams 12" x 9'.
8 Boykin counter shaft and pulleys.
7 Parkersburg standard rig complete with wooden band-wheel, wooden beam, steel pitman, Rex beam hangers.
3 Westinghouse Nuttall Geared Units. 35-15 H. P.
5,000 ft. 10 inch casing, 20,000 ft. 7 inch casing, 15,000 ft. 2 inch tubing 10,000 ft. ⅞ inch rods.

Available for inspection on appointment James F. O'Meara, 603 May Street, Jennings, Louisiana. Phone Jennings 67-W

TWO 250 hp. Heine, one 200 hp. Economy boilers. Jenkins cracking unit. Winkler and Koch tube still. Five bubble towers complete with trays 5'x30'x⅜". Six 500-bbl. stills 10'x30'x⅜" and ½" thick. 14,000' 3" cast iron pipe, 2"-3"-4"-6"-7"-8"-10" standard pipe, and fittings. Condenser and cooling towers. Condenser and cooling boxes. Omar Refining Co., Garber, Oklahoma.

FOR SALE: 7¼ x 14 Wheland-Lucey Power Slush Pump (11,000 Series) in Good Condition. Beardmore Drilling Company, 606 Petroleum Bldg., Wichita 2, Kansas.

FOR SALE

10—New Humphrey, steel angle iron derricks, 87' x 20' base x 108,000# capacity, price $450.00 each.

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Used Engines and Compressors

We Rebuild and Guarantee

L. F. SMITH CO.

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PACIFIC HOT OIL PUMP

Size 3", Type E.T.B. Serial No. 2613, 5000 lb. Test direct connected to 400 HP GE Steam Turbine, 3500 RPM, Type D53, 3 Stage, 175 lb. Steam. Unit complete with lubricating and fluid gland cooling systems.

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(Continued on Next Page)

Classified Advertising

EQUIPMENT FOR SALE

FOR SALE: The Following Used Equipment Located in Louisiana

1 Bulldozer Caterpillar Tractor
30 H.P. with Hydraulic lift blade
1 8 Ft. Adams Road Grader.

1 Unit Rig Model U 17
Complete with Model U 19 auxiliary spudder, Mod. K. 428 Buda Engine, Type A Telescope Mast, Kohler 1,500 Watt light plant, 3,500 feet more or less ⅞" drilling line, 3,500 feet more or less ⅝ sand line, drilling tools, hand tools, and wooden dog house.

1 Complete Drilling Rig, Including
1 86 Ft. steel drilling derrick
1 Draw works powered with Mercury Motor
1 7¼ x 10 Gardner Denver pump
1 Caterpillar Diesel 13,000 engine
1 1,500 gal. Fairbanks water pump
1 17" Oil Bath rotary table
1 Kohler light plant
5,000 Ft. 3½" O.D. 13.30# drill pipe
600 Ft. 4½" O.D. 16.60# drill pipe
1,000 Ft. ⅞" Drilling line, drilling tools, hand tools, 6 x 8 all steel dog house.

Also the Following Used Equipment Located in Illinois

1 Complete Drilling Rig, Including
1 60 Ft. "A" Mast 10 inch pole with draw works built in powered with Mercury Motor
1 Kohler light plant
1 Novo water pump
1 Caterpillar Diesel 13,000 engine
1 6 x 12 Oil Well pump
1 17" Oil Bath rotary table
525 Ft. ⅞" drilling line
3,500 Ft. 4½ drill pipe
1 1,800 gal. fuel tank on skids
1 550 gal. fuel tank on skids
Drilling tools, hand tools, 7' x 9' steel dog house.

Available for inspection on appointment. James F. O'Meara, 603 May Street, Jennings, Louisiana. Phone Jennings 67-W.

FOR SALE: One #2-A National 3000' Steel Mast Drilling Rig with Climax Drilling Engine, 4500' of Wire Line, Wood Shear Poles and Complete Set of Tools. Priced reasonable to settle estate.

MRS. J. J. CASHEN, Admx.
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FOR SALE
1 Super J Model Fort Worth Spudder. Entirely rebuilt and in perfect condition, complete with engine, tools, shear poles, etc. Will sell either all together or in units. Write, Call or Wire.

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ALL POPULAR MAKES
125 HP. 300# W.P. Oil Country Type Newly repaired with new certificates of approval.

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30,000' 5⅝" 10½ lb. Used Casing
70,000' 2" 4 lb. Used tubing
60,000' 2" Standard Used line pipe.

Located western Pennsylvania. Priced to move quickly.

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FOR SALE: One used, new-type magnetometer. Address: Hawaiian American Exploration Company, 58 Sutter Street, San Francisco 4, California.

FOR SALE: 1—300 GPM B. J. Cent. Water Pump direct conn. to 150 hp. Electric Motor, and 1—400 GPM B. J. Cent. Water Pump direct conn. to 2—100 hp. Electric Motors, 1430' Head ea. Complete with starting equipment. George L. Thompson, P.O. Bin J, Avenal, Calif.

STEEL TANKS
Dismantled and reerected
Our experienced crews and equipment now available. We have completed all government contracts. Phone or write.
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Sam Baxter, Pres.
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Ph. 5-3175 Tulsa, Okla.

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500 bbl. to 10,000 bbl. size. Welded and bolted construction. Located Evansville Refinery Company, Evansville, Ind. Will sell where is or dismantled. Phone Tulsa LD 410.

REFINERY EQUIPMENT, INC.
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Mr. Operating Man:
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Your own owned CARS!
Demurrage, Avoidable Labor Expense, Extra
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25, Box, 36-Ft., 40-Ton, steel ends
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WANTED: One (1) Propane Storage Tank capacity approximately 18,000 to 20,000 Gallons—or two (2) Propane Storage Tanks approximately 10,000 Gallons each W.P. 220# hydrostatically tested 440#. ARROW PETROLEUM CO., Centralia, Illinois.

A SULLIVAN 300 or Failing 66 Drilling Rig with or without drill pipe. Furnish inventory, condition, location and price asked for equipment. Box C-200, The Oil and Gas Journal, Tulsa, Oklahoma.

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Let us quote on your nonproductive properties. We will inspect and submit offer without obligation.

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Rough or completely machined. Good delivery.

DROP FORGING DIES

Prompt delivery on drop forging dies. All sizes up to 1½ tons. Largest die sinking plant in West. Write, wire or phone. National Aircraft Equipment Co., 275 No. Avenue 19, Los Angeles 31, California. CA 4111.

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The preforming process frees LAY-SET Wire Rope of muscle-bound stresses. Being preformed, Hazard LAY-SET is not hampered by needless strains. Rather, every wire and strand is free to do its full share of work from the very first hour it is put on your machine.

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Hazard LAY-SET Preformed Wire Rope is "in the service" on countless jobs for the Armed Forces where it is proving its many advantages. Specify it for *your* use.

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IT TAKES 12 BARRELS OF OIL to send a modern aircraft carrier a single mile! Only one of the many demands for oil, this serves to illustrate the tremendous task being accomplished by the Oil Industry—millions of barrels of fuel oil and petroleum products are being made available in order that the largest naval fleet ever assembled can relentlessly roam the vast distances of the seas in search of the enemy.

Hughes Tool Company's part in this task is the mass-production of Rock Bits, Core Bits, Tool Joints and other specialized tools for the essential Oil Well Drilling Industry.

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